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PHILANTHROPY ADVISORY SERVICES

A DONOR'S GUIDE TO CANCER

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Stronger, together

At ECL, the pan-European umbrella organization of national and regional cancer societies, we believe that the fight against cancer is one that can only be won by uniting the efforts of civil society, public authorities and donors. We also believe that fighting cancer does not only mean investing in research and treatments, but in a range of other intervention areas, which might be less obvious to donors but are equally important.

This guide helps donors identify other, less mainstream areas where their donations can make a real difference, such as prevention which is presently grossly underfunded. Indeed a third of all cancers is avoidable through making wiser lifestyle choices, hence making it a cost-effective long-term strategy for the control of cancer. The same is true for actions such as public policy, advocacy or coordination among actors, which are also areas that are in dire need of resources.

The fight against cancer is not one that can be won without the support of private donors, and we hope this guide will help you navigate through the many options available and decide where you want to play a role.

Dr Wendy Yared, Director
Association of European Cancer Leagues (ECL)

Imagine a world without cancer

Contributing to the fight against cancer means leaving a legacy and making a difference in the world.

As a reputable professional, academic and scientific organization, the European Society for Medical Oncology (ESMO) is doing everything it can to keep oncologists at the leading edge of cancer care so that they can provide people living with cancer with the most effective treatments available, and the high-quality care they deserve.

Great advances in basic science are being made today, and with your help new discoveries can be effectively translated into cancer therapies that enhance and prolong life. That is why we are deeply grateful to Lombard Odier & Cie for producing this outstanding Donor's Guide to Cancer. The Guide will help you understand the many ways in which private donations can meaningfully contribute to prevent cancer, to relieve suffering, and to help save millions of lives.

We join Lombard Odier & Cie in inviting you to partner with us and to 'imagine a world without cancer'. As a private donor you have an important role to play in making this dream a reality. Your legacy will be gratefully remembered as a gift of comfort, and a promise of hope, to those in most need.

It is with deepest gratitude that I thank you for supporting the united efforts of the medical community to put an end to cancer, one of the major causes of suffering and premature death worldwide.

Martine Piccart, MD, Belgium
ESMO President

FOREWORD

Medical research has made vast progress in the fight against cancer, and every year brings discoveries that make us more knowledgeable and better able to battle the disease. Yet, cancer remains an invisible and silent threat for many of us. According to the World Health Organization (WHO), it has become the number one cause of death globally, taking more than seven million lives annually.

Few of us have been spared the experience of watching a family member, loved one or friend suffer with the disease. This makes cancer both a very universal and an intensely personal experience – one that profoundly alters our priorities and outlook on life. It is also an experience that spurs many donors and volunteers to commit to fighting this plague, thereby joining the ranks of those who on a daily basis lead the battle to conquer cancer.

Their remarkable work has borne fruit: never before has the prospect of defeating cancer been greater. The number of patients being cured is growing, and today a diagnosis of cancer is no longer synonymous with a death sentence.

Many of the experts in this book agree that we are at the dawn of a "cancer revolution" that will transform the treatment of the disease from a standard approach to an entirely personalized one based on each patient's unique genetic make-up. But this cancer revolution cannot take place without the mobilization of private donors. In many countries, they are the prime source of financing for the researchers and scientists who are constantly developing innovative and promising solutions to conquer the disease.

Your participation – whether in terms of time or of money – can make a real difference in the field. Many of the people I have discussed this subject with say they sometimes feel overwhelmed by the immensity of the challenge that cancer represents, or disoriented when presented with the wide array of areas in which they could make an impact.

This guide is the result of our desire to provide them with answers to their questions. It is illustrated by Gabs' drawings – often moving, always full of humor, and many excerpts from his book titled, "My Father Has Cancer". Its aim is to guide you through the complex and multi-faceted field of cancer research. We hope you will find it a useful tool in your quest to identify those areas in which your participation makes the most sense to you, and in which your donation will make the greatest possible difference.

Anne-Marie de Weck
Managing Partner, Lombard Odier & Cie

USING THIS GUIDE: A LEGEND

Chapters in this guide are structured into several components, which appear with varying frequency from chapter to chapter:

A general introduction to each entry point, providing an overview of basic information of each issue.

SPOTLIGHT side-boxes provide more specific information about a particular aspect, challenge or watershed.

INTERVIEW WITH . . . are extracts of interviews we undertook with some of the world's leading cancer experts who helped us draft this guide. Each highlights different points of view, stories and perspectives on the fight against cancer.

IN THE FIELD presents real examples of projects that are currently under way. These are not meant as recommendations to donors, but rather as eye-openers as to the multitude and heterogeneity of projects to which philanthropic support may be directed.

DONOR'S CORNER side-boxes provide more specific information about a particular aspect, challenge or watershed.

WHY A DONOR'S GUIDE?

At Lombard Odier, we are convinced that giving is not simply a matter of signing a check. It is the result of a complex endeavor that we call "the art of giving". With over 200 years' experience in philanthropy, we are convinced that, as industrialist and philanthropist Andrew Carnegie remarked: "It is more difficult to give money away intelligently than to earn it in the first place."

Why give? To whom? For what cause? What impact do you want to achieve? What are the chances of success, and what are the risks? Faced with a multitude of issues, initiatives and solicitations, donors may rightly feel confused and disempowered. This is why Lombard Odier has established a philanthropy advisory service to accompany you in the challenging, yet fascinating, journey that is "the art of giving".

This guide is an expression of this advisory service. It is addressed to individuals, families and private foundations who want to learn more about how they can use their wealth to serve noble causes. Its ambition is to provide answers to some of the questions that you should ask before starting your philanthropic journey, and to provide you with the necessary tools for designing your own giving strategy according to your values, resources and interests.

WHY CANCER?

We decided to focus our first donor's guide on cancer. This is not because we consider this issue to be worthier than other causes, but because cancer is becoming a growing concern for society and among donors. This is hardly surprising: statistics show that one out of three people will develop a cancer at some point in their lives. It is therefore only natural that more and more individuals are willing to devote part of their giving to the fight against this disease. Many donors, however, shy away from cancer, because they consider this to be a far too complex area of intervention, or because they feel it is not a suitable territory for them. While cancer is indeed a challenging disease, the fight against cancer is multifaceted and there are many areas where your funding is critical. This is especially true in Europe, where cancer benefits from considerably less public funding than the United States, but also in emerging countries where the entire public health structure is deficient.

WHAT WILL YOU FIND IN THIS DOCUMENT?

This is not a scientific publication. Instead, it is intended to be a practical, accessible and instructive tool. We do not set out to give an exhaustive account of all issues, but rather to provide the information and analysis required for a fuller understanding of the extent of the issue, the types of response offered, and the possible areas of intervention that you may want to consider supporting.

This guide begins with background information on the nature of cancer and on the burden that it represents for individuals, families and humanity as a whole. It is then structured around eight "entry points" that we have identified in the fight against cancer. For each of these entry points, we give an overview of the nature of the challenges involved and of the promising solutions that are already in the making. Within each chapter, we decided to include the sometimes divergent opinions of a number of world-class experts as to what areas are currently underfunded or deserve your attention. We also included highlights of existing initiatives we found particularly innovative or inspiring. These are not meant as recommendations, but rather as eye-openers as to the multitude and heterogeneity of projects to which philanthropic support may be directed.

WHERE DO WE GO FROM THERE?

We invite you to use the guide as an interactive map to take you easily to where, through a maze of potential opportunities, you may wish to pause and consider how best to engage in the fight against cancer. Progress is already underway in many areas, and recent breakthroughs give us added hope that cancer can be overcome. The current consensus in the cancer research community is that a new momentum is being created, and you may wish to add your weight to that momentum. We hope that this brochure will help you to decide where and how you could steer your philanthropic journey into the frightening, but fascinating, world of cancer.

We are at your disposal, should you want to engage in conversation with us on this topic and learn more about specific initiatives.

INTRODUCTION

A BIRD'S EYE VIEW OF CANCER

WHAT IS CANCER?

Cancer is a disease in which a group of cells grows uncontrollably and acquires the ability to destroy adjacent tissues, to travel and invade other sites in the body, or to replace normal cells in essential body fluids, such as blood or lymph. Other names for cancer are malignant tumor, malignancy and neoplasm.

Cancer starts with a single cell in which several genes have undergone changes (mutations). These mutations allow the cell to make an unlimited number of copies of itself (proliferate), each copy carrying the same genetic mutations as the original 'parent' cell. The mutations may occur spontaneously or as a result of external factors, such as exposure to ultraviolet radiation, environmental pollutants, tobacco smoke, alcohol, certain infections, obesity and other cancer-producing (carcinogenic) factors (see Chapter 1, page 21). The result is a mass of endlessly-multiplying cancer cells that can grow and destroy normal tissues.

"A malignant tumor is not just a lump of cancer cells as is often thought. It is an organ and functions just like one, with blood vessels, immune cells and other tissue cells recruited to support it and provide its needs."

Douglas Hanahan
Director, Swiss Institute
for Experimental Cancer Research

In the case of solid tumors (such as sarcomas and carcinomas), additional mutations may allow the cancer mass to develop into a virtually autonomous new organ with a life of its own. It may reprogram genes of the normal cells among which it resides, and recruit them to serve its own purposes. It creates its own blood supply and disguises itself to avoid being recognized and destroyed by the body's immune defenses.

In the late, or terminal, stages of the disease, cancer cells from the tumor may travel (metastasize) via the bloodstream or lymphatic system to different, and often distant, sites in the body, where they resume the cancerous process of unchecked growth and tissue destruction, but with greatly increased aggressiveness.

With liquid cancers (such as leukemia and lymphoma), the cancer cells multiply so much faster than standard blood or lymphatic cells that they "crowd out" and replace the normal cells, with potentially-fatal consequences for the patient.

Although cancer derives from a single genetically "derailed" cell, it is not a single disease. Today, we know about 200 different types of cancer, each differing in genetic and molecular composition, in their location in the body, in the type of tissue they grow best in, and in many other respects.

HOW BIG A PROBLEM IS CANCER?

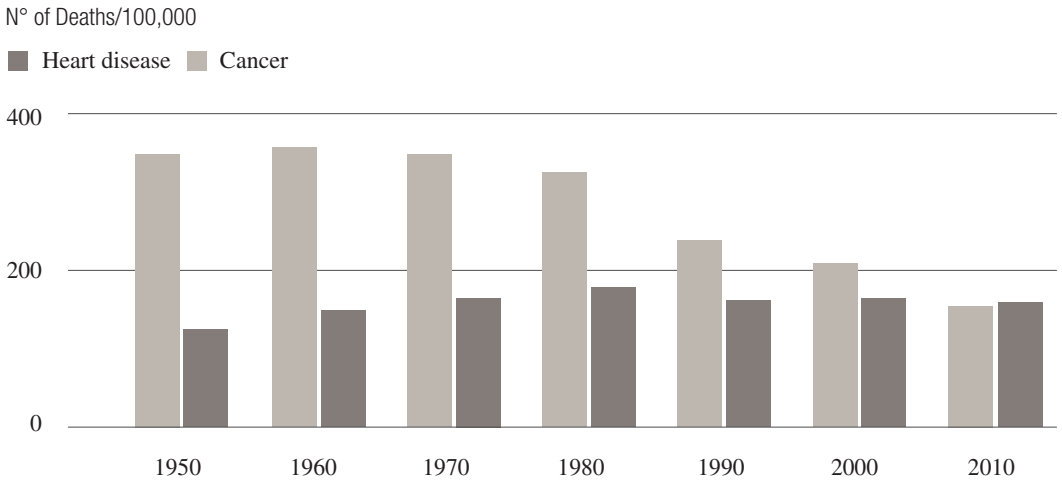
Every year, 13 million people in the world develop cancer, and there are currently about 25 million people living with cancer. Nearly two-thirds of these people will die from their disease. Studies have found that men have a nearly 50% chance of developing cancer in their lifetime and women about a 30% chance.

It is true that new combinations of chemotherapy drugs over the past two decades have led to major increases in the survival rates of patients with certain cancers, such as breast, prostate and testicular cancers, and also certain leukemia in children. Advances in surgical and radiotherapy techniques permit more complete removal of solid tumors with minimal damage to the surrounding tissue, thereby improving survival. Yet despite these advances, cancer is still killing nearly 8 million people throughout the world every year, making it the second leading cause of death after cardiovascular diseases. Today, cancer accounts for one out of eight deaths worldwide, more than HIV/AIDS, tuberculosis and malaria combined.

What is more, cancer is on the rise and is likely to become the world's no. 1 killer in the near future. Assuming no change in risk factors, by 2030:

- The number of new cases annually will have escalated from the current 13 million to 26 million.
- The number of people dying from cancer annually will have soared from nearly 8 million today to 17 million.
- Developing countries, where most of the increase in cancer cases and deaths will take place, will account for 70% of new cancer cases occurring in the world vs. 50% at present.

Progression of cancer (US)



Source: New England Journal of Medicine
http://www.nejm.org

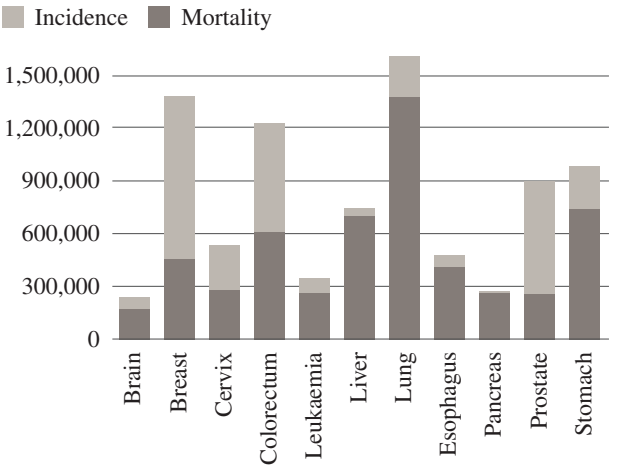
DIFFERENT CANCERS, DIFFERENT INCIDENCES

In 2010, the cancers with the most new cases worldwide were lung (12.8% of new cases), breast (10.9%), colorectal (9.8%), stomach (7.8%) and prostate (7.1%). However, the most deadly cancer, i.e. carrying the highest risk of mortality (case fatality rate) and the lowest chance of survival, is cancer of the pancreas, followed by cancers of the liver, esophagus, brain, and lung.

Cancer incidence, however, differs strongly depending on gender, income, ethnicity and other factors.

For example, the most common cancers among women are breast and cervical cancer, while the most common cancers among men are lung and prostate cancer.

Most frequent and mortal cancers: people affected each year



Source: GLOBOCAN 2008
Section of Cancer Information (11/6/2012)

The predominance of different types of cancer is also different between richer and poorer countries. While cancers of the lung, breast and stomach rank highly across all country income groups, for some other cancer sites, the pattern varied. For example, cervical cancer was responsible for 12% of new cancer cases in low-income countries, but only 1% of new cases in high-income countries.

SPOTLIGHT

The main reason why developing countries will bear the brunt of what has been called "the cancer tsunami" is that these societies are catching up with many of the cancer-prone trends traditionally associated with the more developed world.

Aging, for example, is the strongest risk factor for cancer. Developing countries are also increasingly adopting a cancer-prone lifestyle such as cigarette smoking, lack of physical exercise, nutritional habits that foster obesity, excessive exposure to sunlight and other risky behaviors.

THE ECONOMIC BURDEN OF CANCER

Of all causes of death worldwide, cancer has the greatest economic impact from premature death and disability. Its global economic toll has been estimated to be 20% higher than that of any other major disease.

The 13 million new cases of cancer in 2010 were estimated to cost a total of US $290 billion, according to recent analysis. Medical costs accounted for just over half of the total, with non-medical costs and income losses accounting for the rest (Figure 1).

Figure 1 shows the estimated costs for the four most costly cancers. With the likely twofold upswing in the world's cancer burden over the next 20 years, total annual costs of new cancer cases are also expected to double, reaching US $458 billion by 2030.

According to another study published by the American Cancer Society, the global economic impact of premature death and disability from cancer worldwide was $895 billion in 2008. This figure represents 1.5% of the world gross domestic product.

WHO IS RESPONSIBLE FOR THE CANCER RESEARCH BILL?

A survey conducted by the European Cancer Research Managers Forum (ECRM) has come up with an estimated annual total of US $14 billion being spent worldwide on cancer research alone. Europe and the US are estimated to account for 60% of global funding, although the actual amount spent per capita by the US is about five times greater than the European per capita average. The funding patterns between the two are very different: 96% of total US funding for cancer research comes from the government, mainly through the US National Cancer Institute, leaving only 4% for charities and foundations. By contrast, government agencies in Europe account for only 53% of cancer research funding, leaving 47% for charities and foundations (Figure 2). Philanthropy, however, is a complex phenomenon with different attributes and giving patterns almost on a country-by-country basis, as shown (Figure 3). Nevertheless, it is clear that European foundations and donors are playing a relatively greater role in the funding of cancer research than their counterparts in the US, yet it remains a relatively poorly recognized source of income.

> **"A massive 'pandemic' of deaths and disease from cancer is expected over the next two decades. It will be a real tsunami. Why? Because the developing world is facing the same risk factors that put cancer on center stage in the richer countries — an aging population, increasing use of tobacco and alcohol, and obesity from lack of physical activity."**
>
> Andreas Ullrich
> Director, WHO Cancer Department

STEP-BY-STEP TO A CANCER-FREE WORLD

Efforts are being made across a broad range of activities to reduce the number of people getting cancer, living with cancer, and dying from cancer. Efforts are also being made to improve the quality of life of cancer patients and their families, and to reduce the inequalities associated to this disease.

The objectives of these efforts are realistic and achievable. And to a certain extent, in certain places, they are being achieved, slowly, but surely. In other places though, particularly where resources are lacking, progress is at a standstill or moving too slowly to keep up with the ever-faster pace at which the cancer burden is growing.

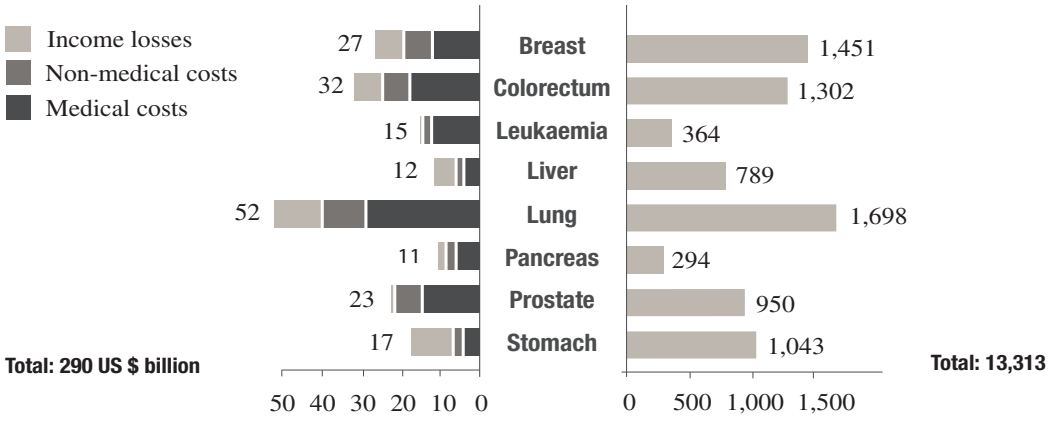
If you are considering engaging in the fight against cancer, the task of choosing what actions to support might seem daunting. To make it easier for you, we have identified eight different, yet interdependent and mutually reinforcing, "entry points" in the fight against cancer. We hope that this framework will help you to see more clearly the role you might wish to play,

1. Estimated costs of new cancer cases by cancer site and cost component, 2010

(in billions of 2010 US $)

Estimated number of new cancer cases (2010)

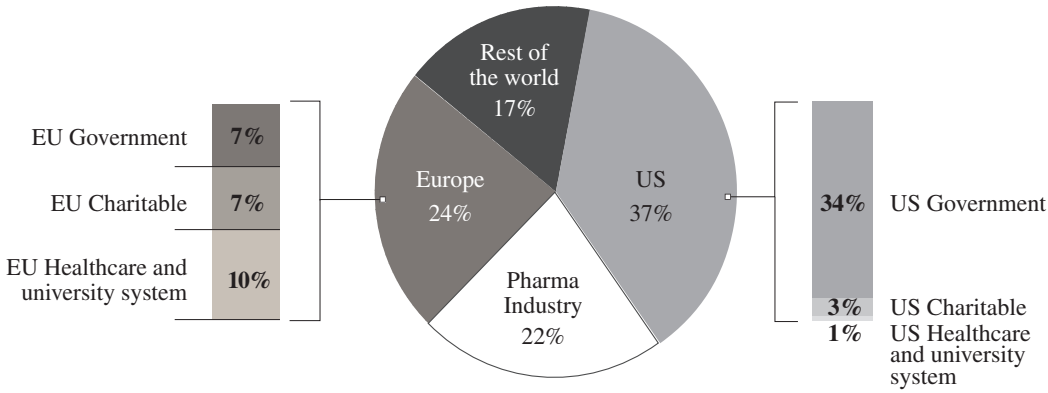
(in thousands)



Source: The Global Economic Burden of Non-communicable Diseases.
A report by the World Economic Forum and the Harvard School of Public Health. September 2011

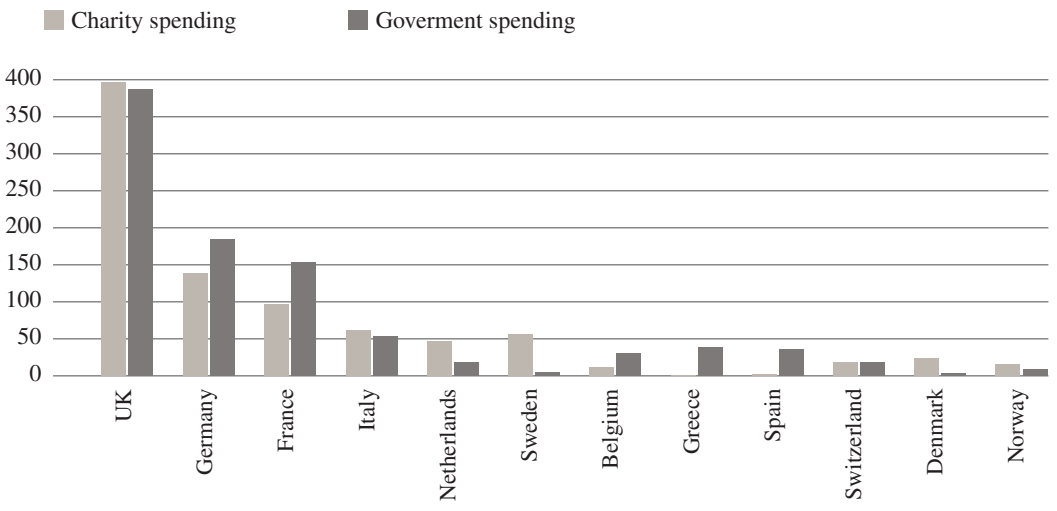
2. Cancer research: funding by source

(% of global spending)



3. Direct spend in Europe by Country, shown as Government against Charity funding streams

(in million €)



Source: Full report at www.ecrmforum.org & Eckhouse S,
Sullivan R. A Survey of Public Funding of Cancer Research in the European Union PLoS Medicine 3 (7), e267.

with regard to one or more areas of activity. Although there is no right or wrong area to target for funding, and each has potential for promising advances, some may be more or less suitable for private donors. Also, it is natural that each of these entry points resonates differently with each one of you, according to your values, ambitions, experiences and preferences. Finally, you may decide to place your support in one specific area or niche, or to diversify your action over several areas. The following chapters of this guide present each of these eight entry points in detail, with specific focus on those aspects that hold great promises and could greatly benefit from your support.

"Progress in fighting cancer will happen stepwise, not all of a sudden. You will see progress on a subtype of lung cancer or a subtype of breast cancer and a subtype of colorectal cancer perhaps every other year or every three or four years. But it will be a long stepwise battle to get more and more of the different diseases within cancer under control."

Alexander Eggermont
Director, Institut Gustave Roussy

THE EIGHT ENTRY POINTS WE HAVE IDENTIFIED ARE THE FOLLOWING:

1. PRIMARY PREVENTION P. 19

2. SECONDARY PREVENTION P. 27

3. BASIC RESEARCH P. 35

4. TRANSLATIONAL RESEARCH P. 43

5. CLINICAL RESEARCH P. 51

6. TREATMENT P. 59

7. SURVIVORSHIP P. 69

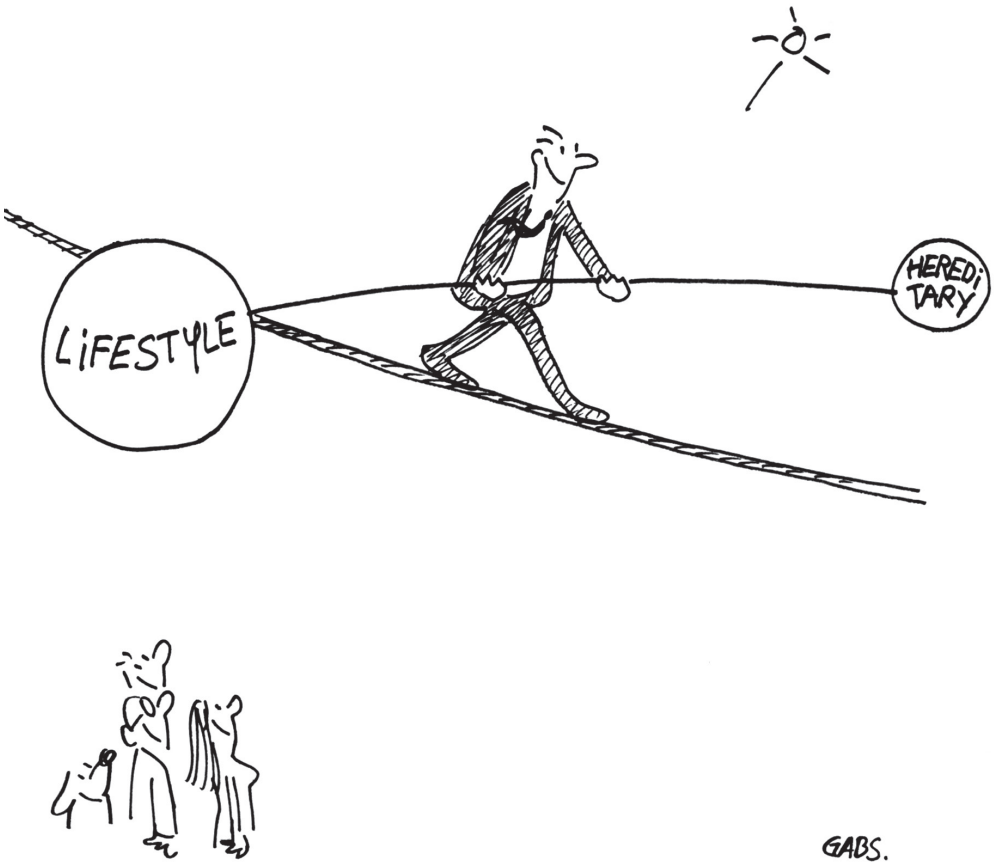
8. TRANSVERSAL ACTIONS P. 77


“The drugs discovered
by researchers gave me
a second chance.
They are the reason
I can wake up every morning.”
Marietta Isler, 27,
patient

PRIMARY PREVENTION

1

PREVENTING CANCER ALTOGETHER



For most of us, cancer is an unavoidable threat — a sword of Damocles ready to fall at the slightest whimof fate. Yet according to experts, cancer is not unavoidable. In fact, some researchers claim that it may be the most avoidable of all chronic diseases.

The genetic instability that causes cancer to initiate and grow is inherited only in a small percentage of the population, and cancer incidence is mostly a result of a combination of environmental factors,which include lifestyle and infections.

LIFESTYLE AND CHOICES

Over the past decades, epidemiological research has identified factors that increase the risk of developing cancer. In about 50% of cancer cases, these factors are linked to lifestyle or personal choices, so in principle about half of cancers could be prevented by avoiding these lifestyle risk factors.

These avoidable risk factors include:

TOBACCO USE, the most devastating risk factor, is estimated to account for 22% of all cancer deaths worldwide. Multiple studies have shown that male smokers are about 23 times more likely to develop lung cancer than non-smokers. Smoking is accountable for 90% of lung cancers incidence and over one-fifth of all cancer deaths. Other than lung cancer, tobacco is associated with least a dozen other types of cancer, including cancer of the throat, mouth, nasal cavity, esophagus, stomach, pancreas, kidney and bladder.

ALCOHOL ABUSE is associated with cancers of the mouth (oral cavity), liver, pharynx, larynx, esophagus, breast and colorectum. According to a recent study, alcohol is accountable for 44% of upper aerodigestive tract cancers, 33% of liver cancers and 17% of colorectal cancers in men.

INSUFFICIENT PHYSICAL ACTIVITY, combined with poor nutrition and excessive bodyweight, are also very high risk factors and are particularly linked to cancers of the breast, colorectal, stomach and esophagus. In the United States, evidence suggests that about one-third of cancer deaths in 2012 will be related to obesity, physical inactivity and unhealthy diets.

INDOOR TANNING and excessive exposure of skin to sunlight (ultraviolet radiation) cause skin melanoma, to which fair-skinned, blue-eyed people of Celtic origin are particularly prone. Some studies show that about 65% to 90% of melanomas are caused by exposure to ultraviolet light, and that many of the 2 million plus skin cancers diagnosed annually could be prevented.

ENVIRONMENTAL AND OCCUPATIONAL EXPOSURE, including urban air pollution, smoke from indoor use of solid fuels, asbestos, radon, pesticides and other toxins present in consumer goods (including building materials, food and drink), are estimated to account for 2 to 4% of cancer deaths.

CANCER-CAUSING INFECTIONS

A number of infectious organisms, such as the hepatitis B virus (HBV), human papillomavirus (HPV), human immunodeficiency virus (HIV), Helicobacter pylori, and others, have now been identified as causes of cancer. Together, they account for 18% of cancer cases worldwide and up to 26% cases in developing countries. In fact, many of the most common cancers in developing countries, such as cancers of the liver, stomach and cervix, are caused by infections. To date, vaccines are available for only two cancers caused by viral infections — cervical cancer caused by HPV and liver cancer caused by hepatitis B — but these two cancers already account for 10% of cancer cases worldwide.

"Tobacco is responsible for more than 15 types of cancer. It is our chief weapon against cancer, quantitatively speaking. By simply stopping tobacco use, we would prevent almost two million cancer deaths a year."

Andreas Ullrich
Director, WHO Cancer Department

HORMONAL RISKS

Hormones play a complex role in determining the development of cancer by promoting cell proliferation, and are critical factors in cancers of the breast, uterus, ovaries, prostate, testes, thyroid and bone. The high-risk behavior patterns associated with these cancers include:

- Late pregnancies, lack of children, no breastfeeding, or hormone replacement therapy (HRT) for menopausal problems.
- Use of oral contraception is shown to slightly increase the risk of cancer of the breast and cervix, but reduces the risk of cancer of the ovaries and uterus.
- On the other hand, removing the uterus (hysterectomy) or tying the fallopian tubes (tubal ligation) will drastically reduce the risk of cancer of the ovaries.

Although experts have recognized these risks for years, they are still not sufficiently understood by the wider public.

Anne, a 36 year-old, explains:
"I would have had a lot of lifestyle changes had I known of the risks beforehand: I took the pill for 14 years, and never had any kids, so that's a double-whammy. I also would have cut back on drinking and paid more attention to my weight and diet. If there had been more emphasis on breast cancer in health classes in school, I know it would have changed me a lot to know ahead of time."

SPOTLIGHT

UNAVOIDABLE RISKS

Some cancer risks do not lend themselves to individual control or choice. All biological risk factors are, by definition, unavoidable, and include age, gender, ethnic origin, skin complexion and hereditary traits. Other risks, such as certain infections, are currently unavoidable, although this might change in the future.

Age is clearly the most important unavoidable risk factor: in the United States, for example, about 77% of all cancers are diagnosed in people aged 55 and older.

Some reproductive risk factors, such as onset of menstrual bleeding (menarche) at an early age, onset of menopause at a late age and infertility, are all unavoidable risk factors for cancer of the uterus (endometrium).

As for hereditary transmission of cancer, it is important to stress that what is inherited is a predisposition to cancer, and not cancer per se. Parents can pass on to their offspring genes with potentially cancer-leading mutations: people with these mutations have a 'head start' on the cancerous process, as a mutation that can contribute to cancer is already present in every one of their cells. However, only about 5% to 10% of all cancers are the direct result of inherited gene mutations.

There are three cancer-causing infectious organisms for which no vaccine exists:

- The bacterium Helicobacter pylori causes an estimated 490,000 cases of stomach cancer every year, accounting for more than 5% of cancer cases worldwide.
- HIV, the AIDS virus, indirectly causes cancer by lowering overall immunity. Kaposi sarcoma, a cancer found in up to 50% of AIDS patients, is caused by a virus that takes advantage of these patients' deficient immunity.
- Hepatitis C virus causes an estimated 70,000 cases of liver cancer.

IN THE FIELD

Preventing cervical cancer in El Salvador

THE PROBLEM

Cervical cancer is the second most-common cancer amongst women worldwide.Every year, 530,000 women are diagnosed, and 275,000 women die from this cancer, almost 90% of whom are in developing countries. This is all the more disturbing given that cervical cancer is both preventable through vaccines and easily detectable and curable if screened early enough. In fact, cervical cancer is the result of lesions caused by the Human Papillomavirus (HPV), the most common sexually transmitted infection. It is a slow maturing cancer, and usually takes more than ten years for the infected lesion to become a cancer. However, in poorer countries with inadequate resources, most cervical cancers are diagnosed in women around the age of 45, by which time the cancer is too advanced for treatment.

In Latin America, cervical cancer is the leading cause of cancer deaths in women, killing 31,700 women every year in the region. More specifically, El Salvador has the second highest number of cervical cases (over 1,100) and deaths (560) after Guatemala, although a national guideline is in place and the two vaccines against HPV are legally registered.

THE IDEA

A four-year pilot project is being conducted in El Salvador as a multi-partnership initiative involving the Union for International Cancer Control (UICC), the Ministry of Health and a local civil society organization (ASAPRECAN). The project is also being run in conjunction with the World Health Organization (WHO) activities in the region. In each department, the project plans to introduce mass HPV vaccination, made available in schools, churches and mobile clinics. It will also provide low-cost and on-the-spot screening, as well as treatment (a solidarity fund will cover the costs for those women who need it). Throughout the project, awareness-raising campaigns will be run through community centers and via local media to encourage families to vaccinate their daughters, and encourage women to be screened. Lastly, the project will work with the International Agency for Research on Cancer (IARC) and the El Salvador Health Ministry to improve the country's cancer registry.

THE IMPACT

In its four years of existence, the project will screen 10,000 women aged between 30-40, and vaccinate 52,700 girls (85% coverage of girls aged between 10-14) in the departments of Sonsonate, Cuscatlán and San Vicente. The project will also target 120,000 men and women with direct community education activities. Working hand-in hand with the Ministry of Health, it also supports the preparation and implementation of an improved national strategy to tackle cervical cancer.

The long-term objective of this pilot project is to show the significant socio-economic impact of the use of early detection, treatment and preventive vaccination to reduce the number of women with cervical cancer. The ultimate aim is for this project to become a case for the implementation of cervical cancer vaccine and screening throughout the rest of the country and in other parts of the region.

DONOR'S CORNER

Primary prevention provides an ideal opportunity for private donors: less than 5% of all funding is dedicated to primary prevention and identifying environmental links to the disease, because this area is of little interest to the pharmaceutical industry, and is still poorly supported by the public authorities. What's more, cancer prevention could have wider positive repercussions, since many risk factors for cancer are shared with other common conditions, such as vascular disease and diabetes.

There are many actions you can take to drastically reduce the number of people who develop cancer (thereby significantly reducing the human and financial cost of this disease). These actions may take many different forms in order to tackle the various aspects of this challenge.

ADVOCACY & PUBLIC POLICY

All too often, laboratory discoveries take years to enter the public domain and inform policy making. Raising awareness about the consequences of certain risk factors and changing policies to reflect those risks is a challenging, but necessary and highly impactful, area of intervention. As a private donor, you can help fund the publication of position papers that will help to shape public policy on issues such as healthy diets in schools and cafeterias. You could also support awareness-raising campaigns that highlight the benefits of physical activity, or help finance lobbying initiatives to regulate the use of certain high-risk substances. Many organizations are already active in these fields, but need more money to scale up and replicate their initiatives.

RESEARCHING RISK AND ANTI-CANCER FACTORS

Much more research is needed to understand how certain substances play a determining role in causing or preventing tumor development. Identifying these factors will be key in the fight against cancer. Studies are currently underway into a wide range of risk factors, including pesticides, electromagnetic waves and certain chemicals used in the food industry (e.g. aspartame). At the same time, other research seeks to understand whether, and how, certain substances (including green tea, soy and certain spices) can reduce the incidence of cancer. Private donations to research projects in these fields can help us to understand how the number of people getting cancer can be reduced.

CHEMOPREVENTION DRUGS AND VACCINES

In recent years, there has been a lot of progress made in the field of chemoprevention drugs and vaccines: approximately 150 clinical trials are currently underway to identify drugs that can reduce the incidence of cancer in people at risk (e.g. due to hereditary predisposition, exposure to occupational risks). Another, related, area is that of vaccines to treat cancer-causing viruses, because funding is needed not only for research into new vaccines (e.g. for Helicobacter pylori and Hepatitis C), but also for improving access to existing vaccines. This is especially important in developing countries where deaths from preventable liver and cervical cancers are increasing all the time. In most instances, this aspect is an underfunded area of engagement in which private donations can make a real difference.


“Basic research needs donations to continue developing efficient personalized therapy.”
Nicolas Mach, 50,
oncologist

SECONDARY PREVENTION

DETECTING CANCER AS EARLY AS POSSIBLE


THAT'S ME?
UNFORTUNATELY!


I'M AFRAID!!!


BLOC A
SO?
IT'S LIKE I SAID: IT'S JUST A SMALL TUMOUR, NOTHING TO WORRY ABOUT!

Today, it is widely acknowledged that the earlier the diagnosis of cancer is established, the more likely the chances of successful treatment will be.

In fact, early detection is thought by many experts to be the most promising and most feasible means for reducing cancer deaths. The question is: how early is early in relation to the progression of cancer? Many cancers take decades to digress from a single mutant cell to a full-blown metastatic disease.

This time lag offers a large window of opportunity in which to detect malignant tumors at an early enough stage for a cancer to be still curable. For example, before developing colorectal cancer, one of the most common cancers among men, patients typically develop a benign growth called a polyp, which will take between 5 to 10 years to become a tumor. If there were a simple blood test to identify polyps (see 'Spotlight: Biomarkers') and have them removed through a simple colonoscopy, some 600,000 fewer people would die from this sort of tumor every year.

"We need much more research on better ways of preventing cancer and research that focuses on the earliest stages of cancer progression. We desperately need to find marker molecules in the blood of people who are not yet patients. We need molecules that will tell us that this or that person has got cells that are likely to become a breast cancer. We need a blood or stool test to detect at the very earliest stages a polyp that could turn into a malignant tumor in the intestine."

Alexander Eggermont
Director General, Institut Gustave Roussy

Some research suggests that at least half of all cancer deaths could be prevented if detected earlier.

Regular check-ups and screenings by healthcare professionals can indeed result in the detection and removal of precancerous growths (for example for cancers of the cervix, colon and rectum), as well as diagnosis of cancers at an early stage, when they are most treatable. Screening can be done using a number of different techniques and examinations. These include:

PHYSICAL EXAMINATION AND PATIENT HISTORY: Physical examinations should be made regularly either with your general practitioner or in a hospital. Usually performed by general practitioners, these consist of examining the body to check for general signs of health, and to look for lumps or anything else that seems unusual. An analysis of the patient's health habits, past illnesses and family history should also be conducted.

LABORATORY TESTS: If there is a reason to suspect cancer, doctors may order certain cancer laboratory tests or decide on a biopsy. These procedures test samples of tissue, blood, urine or other substances in the body to check for cancer cells or specific markers (see Spotlight: Biomarkers). These tests are very commonplace, and may include PSA (Prostate-Specific Antigen) blood tests for prostate cancer and 'Pap smears' (Papanicolaou tests) for cervical cancer.

IMAGING PROCEDURES: An imaging test is a technique used to see what is going on inside the body. Imaging procedures send forms of energy (x-rays, sound waves, radioactive particles or magnetic fields) through the body. The changes in energy patterns made by body tissues create an image or picture, which can help to identify abnormal tissues, such as cancer. These tests include procedures such as MRIs, ultrasound or mammograms. Imaging tests are somewhat different from endoscopies (such as a colonoscopy or bronchoscopy), which consists of inserting a flexible, lighted tube with a lens or a video camera inside the body to get a better view of any potentially-damaged organs.

GENETIC TESTING: Genetic testing (also called DNA-based testing) is one of the newest and most sophisticated techniques used to determine the likelihood of a person developing cancer. These tests analyze genes, chromosomes or proteins to help predict the risk of disease and identify carriers. More than 1,000 genetic tests are available for many different diseases, including breast, ovarian, colon, thyroid and other cancers. Although techniques and procedures have progressed greatly in recent decades, screening still has shortcomings:

- Firstly, only certain cancers can be diagnosed early through screening. These include can-

cers of the breast, colon, rectum, cervix, prostate, oral cavity and skin. Furthermore, early detection does not always improve the chances of successful treatment or help the person to live longer.

- Secondly, false test results are possible: screening results can sometimes appear abnormal, even though there is no cancer present, or negative, even where tumors are present.

- Lastly, diagnostic testing procedures require financial, technological and logistical resources that are often beyond the means of developing countries and are seen as of less importance in richer ones.

Despite all these drawbacks, screening remains one of the best resources we have to fight cancer, and it should be used more consistently, even where patients are not at risk. For example, Lauren, a 35-year-old mother with three kids under the age of 7 and no family history of cancer, had never thought of breast cancer. However, when her husband was transferred abroad, her gynecologist suggested that she should have a mammogram before they went abroad. "That mammogram saved my life. My priority today is about bringing awareness to a disease that is sometimes ignored by young women."

SPOTLIGHT

BIOMARKERS

In a recent film version of Alice in Wonderland, the Queen of Hearts inspects a line of frog footmen to determine which frog ate her tarts. One footman has a bit of jam in the corner of his mouth that gives him away. That jam is a biomarker, a physical clue about an otherwise invisible problem or process.

Much hope in the field of early detection is being placed on so-called "biomarkers": a biomarker is generally a protein molecule that can be detected in a blood test, and may denote the presence of cancer in a person's body.

Amongst the well-known biomarkers of cancer, high levels of prostate-specific antigen (PSA), a molecule found in the blood of all men, may indicate a risk of prostate cancer. The Philadelphia chromosome, another biomarker, is found in 95% of people with a certain form of leukemia. Today, there are about a dozen biomarkers used to detect cancer, and many more are currently being researched, as well as ways to detect them more efficiently, effectively and at lower costs.

Some biomarkers are also being used for treatment. A biomarker drug will kill the specific unique cancer of the patient without damaging normal cells, as traditional chemotherapy does (see Chapter 6, page 61).

Measuring changes in the concentration of a biomarker in a patient's blood can also indicate whether treatment is likely to work or is working effectively, how aggressive the patient's tumor is, what the patient's prognosis is, and whether, in a cancer survivor, the cancer is recurring.

However, biomarkers do have a downside. Not every cancer produces a biomarker, and not every biomarker is specific to a given cancer. However, they can be used by doctors to flag-up issues for further diagnosis.

IN THE FIELD

A biomarker to cancer predisposition

THE PROBLEM

Between 5-10% of cancers are due to genetically-inherited predispositions. People with such predispositions should undergo special examinations and have regular check-ups to enable early detection. However, identifying these patients is not always easy, and this is why the development of a simple and inexpensive marker to identify those most at risk of developing the major types of cancer would be very useful in terms of public health.

THE IDEA

A team from the Institut Curie, led by Dr Mounira Amor-Guéret, is working on a rare genetic disease called Bloom syndrome (BS), which combines specific abnormalities of the chromosomes with a high risk of developing cancer. The team recently demonstrated that the cells of these patients presented very low levels of an enzyme called cytidine deaminase (CDA). The results of their studies indicated that CDA deficiency contributed to Bloom syndrone. More interestingly, results also strongly suggested that CDA deficiency in individuals not affected by Bloom syndrome predisposed them to cancer. CDA is very easy to diagnose by a traditional blood test, so the project aimed to determine whether CDA could become a cost-effective and efficient marker for determining the risk of cancer. Tests were conducted on over 200 patients, and research is now underway to understand these results and undertake new trials.

THE IMPACT

The results of this research could lead to the first identification of an alteration of an enzyme (which may have a genetic, as well as environmental, origin), which could be used as a marker for cancer predisposition. One of the most important benefits of this research would be the identification of an extremely simple and inexpensive detection tool and the establishment of procedures to monitor individuals and families with abnormal CDA levels.

DONOR'S CORNER

Screening and early prevention are priority areas in the fight against cancer, and although much has been done in recent decades, challenges still remain. Prevention research must assume a higher profile and greater importance in the broad cancer research strategy and in those cancer plans currently being developed. Much of this is already covered by governmental programs and by pharmaceutical companies that can develop highly profitable tests. However, there is still room for donors in a number of areas.

RAISING AWARENESS

Reinforcing the importance of early detection remains critical. Early detection should be performed among the general population and specific high-risk target groups. Advertising campaigns promoting Pap tests in women or regular PSA tests among men are relatively cost-effective measures that you could support and that could help boost early detection and drastically reduce the cancer burden.

ADVOCACY AND PUBLIC POLICY

Legislation and public health systems are lagging behind in terms of institutionalizing medical findings: for example, in most European countries, mammographies are performed on women aged over 50, although about 20% of breast cancers develop in younger women. For a donor, this could mean supporting working groups and white papers that would help to introduce better cancer screening measures in national health plans, or advocating the adoption of innovative and cost-effective tests and measures.

TRAINING TO DETECT

Detection should be more widely taught, both to medical staff and the wider public. For example, you could support training programs to teach simple and cost-effective measures, like breast self-palpation or skin self-examination in schools and in the workplace. More funds are also needed to train all medical staff, including nurses and general practitioners, to detect early signs of cancer, and to perform routine testing (see In the field, Chapter 8, for some innovative training programs targeted at visually impaired women).

IMPROVED ACCESS

Although some sophisticated and highly reliable screening techniques do exist, access is not easily available to everyone. This is especially true in developing countries, but also in Europe and North America amongst disadvantaged communities and suburban and rural communities. You could change this by supporting initiatives that help reduce inequality in early screening, such as helping to fund imaging machinery or low-cost, low-technology blood tests that could help save thousands of lives.

NEW AND IMPROVED TECHNIQUES

Existing screening and detection techniques could be further improved and developed. This is particularly true in the case of biomarkers, many of which are currently under development, and imaging techniques, which are becoming more and more effective, but are still very expensive. In this area, as a private donor it is important to concentrate on specific research projects or needs (for example, lab equipment or fellowships) that are not already adequately covered by public funding or pharmaceutical companies.

“Cancer research is the future. Encouraging donations means saying yes to life.”

Nicole Grandjean-Hallez,
49, nurse
and study coordinator

BASIC RESEARCH

UNRAVELLING COMPLEXITY

SPOTLIGHT

SUPER CANCER CELLS

Stem cells, found in embryonic and some adult tissues, have the potential to develop into cells of many different organs and tissues. Such cells have recently been found in malignant tumors. These so-called cancer stem cells are like “super cancer cells” with the ability to proliferate infinitely and resist both chemotherapy and radiation.

Researchers now believe that many human cancers develop from these stem cells, and that therapies often founder because they fail to kill the cancer stem cells.
The ever-increasing research efforts into the field of stem cells carry a promise to provide missing pieces of the puzzle of discovering and targeting the Achilles heel of cancer cells, which would have a major impact on the development of innovative strategies to conquer cancer.

Basic research (also referred to as pure or fundamental research) aims to increase understanding of the fundamental principles underlying cancer growth, as well as how it spreads throughout the body, killing healthy cells. Although this research is not intended to deliver immediate benefits or solutions, in the long term, it will represent the foundations for applied solutions, be they in prevention, screening or treatment. Many of those touched by cancer understand this challenge, as explains Nancy Bouchard, whose son fought cancer, non-Hodgkin's lymphoma (NHL) Type B: "Only research will make it possible to identify the causes of this disease and take the measures required to prevent it. My son was cured thanks to the efforts and resources invested in cancer research over the course of many years. Every day, scientific research gives us a better understanding of the complexity of this disease. Better understanding means adopting increasingly effective methods, better tools, diagnostics and treatments to beat it."

According to many, cancer-related basic research is burgeoning: some speak of "a scientific revolution", others of "a new era of cancer medicine", yet others speak of being "at a defining moment in our ability to conquer cancer". Progress is certainly being made, largely thanks to new breakthroughs and technologies developed over the past decade. For example, probing the genetics of cancer cells, which has become a cornerstone of current cancer research, owes much to the Human Genome Project, which was completed in 2003 after identifying all the 20,000 to 25,000 genes in human DNA. Moreover, technologies such as nanotechnology have allowed a leap forward, allowing researchers to explore and manipulate cancer-related molecules that are important during the very earliest stages of cancer progression.

Basic research currently revolves around three main approaches. While being very distinctive, these three areas are complementary, and are all seeing huge strides forwards that justify the current optimism that pervades the cancer community today.

GENOMICS: Genomics involves the study of DNA and the mapping of the different genes that make up the genome (the complete set of genetic material of an individual). It is one of the most promising fields and frontiers to understanding cancer. More specifically, genomics allows the tracing of a "blue print" of each tumor for improved understanding in how to fight it. In fact, each cancer has a genome sequence, or blueprint, that is specific to it, irrespective of its location (lung, breast, etc.). If we identify subclasses of cancers according to their genome sequence, rather than their location, we can focus on treating and preventing these cancers accordingly.

"We have at hand the methods to identify essentially all of the genomic changes in a cell and to use that knowledge to rework the landscape of cancer research. This knowledge gives us a crucial opportunity to accelerate research into the study of cancer and its treatment."

Harold Varmus
Director, National Cancer Institute (USA)

EPIGENETICS: We have learned that genes alone are not enough to explain how cancer arises. It is becoming clear that the chemical "packaging" on which genes sit can also determine how cells function and potentially evolve into cancer cells. This area of research, known as epigenetics, is a recent addition to the body of knowledge on cancer, and is becoming an increasingly important area of cancer research. According to the International Agency for Research on Cancer (IARC), epigenetics is "one of the most rapidly expanding fields of modern biology, with enormous implications on our thinking and understanding of biological phenomena and diseases, especially cancer".

PROTEOMICS: This is the study of proteins, and more specifically proteins typically associated to certain tumors, known as biomarkers, that can be useful to diagnose cancer. Proteomics enables the identification and classification of cancers, not according to their genetic modification, but according to the way they interact with the system and evolve. This is because while the genes are the "ingredients" of the cell and the epigenetics are the "recipe", the proteins encoded by the genes are ultimately the functional players that drive both normal and disease physiology.

DOUGLAS HANAHAN, DIRECTOR OF THE SWISS INSTITUTE FOR EXPERIMENTAL CANCER RESEARCH, AND PROFESSOR OF MOLECULAR ONCOLOGY IN THE SCHOOL OF LIFE SCIENCES AT THE SWISS FEDERAL INSTITUTE OF TECHNOLOGY, LAUSANNE.

The mood today in the cancer research community seems upbeat. Do you share this optimism?

There are certainly developments to be optimistic about. With the new technologies that have become available to us in the past five to ten years, we can now look inside a cancer. What we're seeing is really exciting. We are seeing how genetic mutations can turn normal cells into cancer cells by reprogramming the entire functioning of normal cells. We are gradually gaining an understanding of how this reprogramming is achieved, and I'm sure we're on our way to using that understanding to fight cancers more effectively. So, yes, I am very optimistic, but also realistic. We're still far from the end of the road, but we're on our way.

What important questions does basic research still have to answer?

One exciting frontier of research that calls urgently for an answer is why tumors adapt to, and resist, treatment. Very often when chemotherapy or radiotherapy is administered, the cancer recedes or seems to disappear, but then after a time returns with a vengeance. It has in some way adapted and become resistant to the treatment. A growing number of research labs are trying to find out just why and how cancers do this.

Is this research producing any findings that could have a direct impact on the current treatment of cancer patients?

We do have interesting leads. You see, the chemotherapy and radiotherapy that are used to kill cancer have up until now been targeted just at cancer cells. But we have found that a malignant tumor lodged in a tissue can recruit a variety of normal cells from the adjacent tissue to produce a supporting cellular framework that we call a tumor "microenvironment". The recruited cells join up, as it were, with the cancer cells to help the tumor grow and invade other tissues. We are finding that the microenvironment contains many different types of cell – blood vessel cells, immune cells, and many other types of cell. We are now trying to understand how these cells are recruited by the tumor, what they are doing to help the tumor, and what signals they exchange with each other and with the cancer cells. It could be that this microenvironment of recruited cells plays a part in the adaptive resistance of cancers to toxic drugs and radiation. We did attempt some years ago to try and destroy the network of blood vessels that bring nourishment to a tumor, but that approach only had a transient effect on the tumor. If our research shows us that it's the whole supporting microenvironment that we need to attack, that would be a real breakthrough and would force us to change or expand the treatment targets we've been using up until now.

"I AM VERY OPTIMISTIC, BUT ALSO REALISTIC"

IN THE FIELD

Identifying genes that cause childhood cancer

THE PROBLEM

The causes of childhood cancers are still largely unknown. Typically, factors that trigger cancer in children usually differ from those that cause cancer in adults, such as smoking or exposure to environmental toxins. In most cases, childhood cancers appear to arise from mutations (or changes) in the genes of growing cells. Some of these gene mutations may be inherited, while others occur randomly and unpredictably, and there is no effective way to prevent them. Sometimes, a doctor might spot early symptoms of cancer at regular check-ups. However, some of these symptoms are quite generic (e.g. fever, swollen glands, anemia) and can be associated with many other more common conditions. Because of this, it is important to learn more about childhood cancer and how genes are involved in their development.

THE IDEA

In 2006, a team led by Professor Nazneen Rahman of the Institute of Cancer Research set up the FACT Study (Factors Associated with Childhood Tumors): this is an international initiative, the largest of its kind in the world, and now includes over 5,000 children. The study aims to identify genes that cause or increase the risk of childhood cancer occurrence. This can lead to screening or preventative treatments to reduce the risk of cancer and improved diagnosis and management of children with cancer. More broadly, identification of genes that cause cancer increases our understanding of how and why cancers occur. This is a long-term research program intended to run until at least 2020, and typically meant to find at least one new gene a year.

THE IMPACT

The potential repercussions of these fundamental findings could be critical in the fight against childhood cancers. However, the full, long-term implications of faulty genes can take many years to be fully understood, and will be the subject of ongoing long-term research. The development of specific drug therapies tailored to genetic defects will indeed take many years. However, the FACT project will make all the relevant information available so that drug companies and researchers in drug development can take it forward. In fact, the Institute of Cancer Research strongly values and favors close interaction between scientists and clinicians. This results in a rapid and efficient flow of findings from the laboratory into pilot clinical studies, and speeds up the delivery of scientific advances in diagnosis and treatment into real patient benefit.

DONOR'S CORNER

Efforts to explore the basic mechanisms underlying cancer cover a wide range of activities, including basic research, which is typically undertaken by universities and financed by public funding or by private donors. It consists of long-term projects that will reap fruits only after decades, but that do constitute the necessary footing on which other, more applied, research is developed. Here are a few examples of concrete needs that you, as a private donor, may want to consider.

RESEARCH EQUIPMENT

As research advances and becomes more and more sophisticated, labs need to have access to the best cutting-edge technology in terms of machines and equipment. For example, DNA microarray technology uses robotic machines to arrange minuscule amounts of hundreds or thousands of gene sequences that enable scientists to study which genes are active in different cancer cells. Financing projects to improve equipment is absolutely vital if research is to evolve, and so is providing labs with access to this technology, which is often quite expensive.

SPURRING TALENT

There is a very real need to help spur talents in basic research, especially in emerging countries where neither the infrastructure nor the educational system offer many opportunities to nurture young promising researchers. You could, for example, support initiatives that help young scientists to access top-notch training, either by developing local capacities or through scholarships, exchanges with excellence-centers or distance learning platforms.

MAPPING UNDERFUNDED AREAS OF RESEARCH

The scope of basic cancer research is vast. In recent years, some topic areas have attracted growing attention from private and public funders, such as genomics, whilst others remain relatively underdeveloped. One way to address this problem would be to support a global mapping of existing research projects, which would help to identify areas that are currently under-researched and underfunded.

INCREASED TRANSPARENCY AND COOPERATION

Research is simultaneously competitive and collaborative. Although information sharing is vital if research is to advance, there is a great deal of fragmentation running across geographic and thematic borders. To help make the sector stronger, you may want to fund initiatives that help information flow, such as open-source databases, medical journals, and the standardization of certain research methods (thereby making results comparable).

“The fight against cancer is both a personal and global one. One in which we all have a role to play.”

Tuan Nguyen, 27, designer

TRANSLATIONAL RESEARCH

BRIDGING THE GAP BETWEEN THE LAB AND PATIENTS

TARGETED DRUG THERAPY

Targeted drug therapy (also known as molecularly targeted drugs) is a major theme of translational cancer research today: it holds the promise of being more selective, thus harming fewer normal cells, reducing side-effects and improving the patient's quality of life.

In fact, targeted therapy blocks the growth of cancer cells by interfering with the specific targeted molecules needed for tumor growth and progression, rather than by simply interfering with rapidly dividing cells (e.g. with traditional chemotherapy).

Targeted cancer therapies are being studied for use alone, in combination with other targeted therapies, and in combination with other cancer treatments, such as chemotherapy. In the United States alone, translational research has already produced over 40 molecularly targeted drugs that have been approved for human treatment. Translational oncology brings almost daily a new molecularly targeted drug to be tested clinically. Eventually, treatments may be individualized on the strength of the unique set of molecular targets produced by a patient's tumor.

Other applications of translational oncology include the search for a therapeutic or preventive vaccine against cancer (see 'In the field'), for new and more effective biomarkers, for improved treatments and therapies etc.

SPOTLIGHT

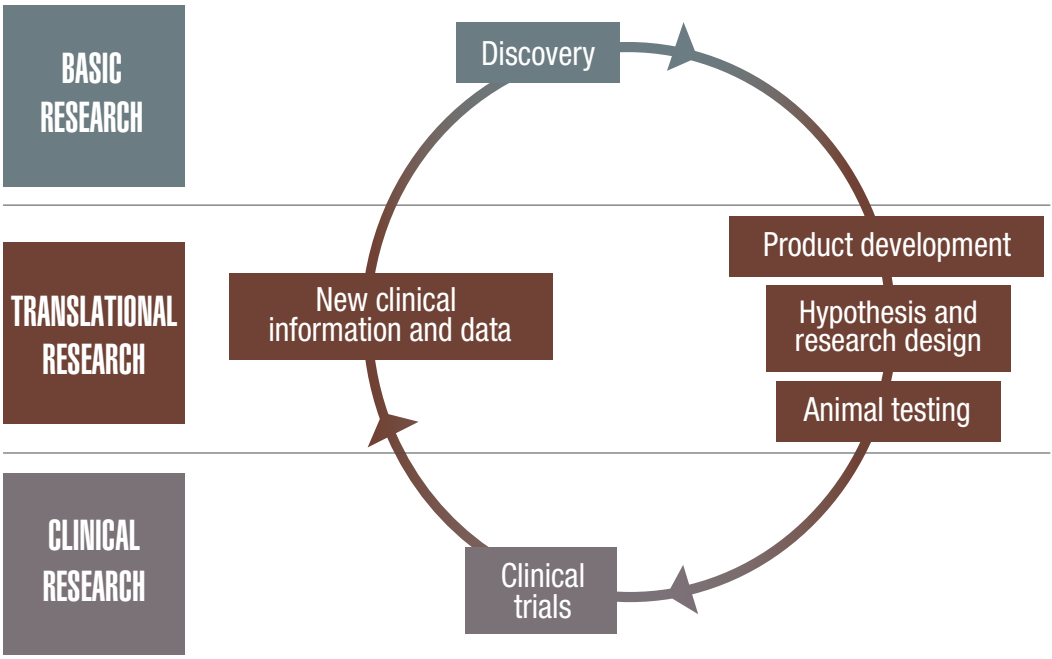
The past decade has seen unprecedented interest in translational cancer research, also known as "translational oncology". This area represents a critical one, since it bridges the gap and allows discoveries arising from basic research to be transformed into practical clinical applications that respond to patient needs.

Indeed, as the wealth of knowledge and information produced by fundamental researchers pours in, it has to be made "actionable" and transformed into concrete tools, treatments and procedures that will be able to save lives.

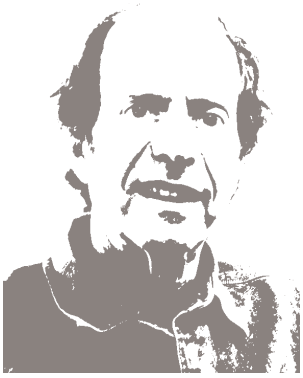
To this end, translational cancer research explores ways of applying cutting-edge scientific discovery to new approaches to cancer prevention and treatment. By the same token, it also aims to prevent basic researchers from losing sight of the pressing needs of cancer patients and reduce the time it takes for a promising research finding or concept to be tested, prior to being used on patients.

"Translational oncology is a highway of information. It covers a whole gamut of activities—from basic sciences using mouse models to clinical trials with patients. It takes ideas and findings from the laboratory into the clinical setting and it reduces the time taken to find solutions to clinical questions."

George Coukos,
Director, Ludwig Center for Cancer Research



RICHARD SIMON, CHIEF OF THE BIOMETRIC RESEARCH BRANCH IN THE DIVISION OF CANCER TREATMENT AND DIAGNOSIS OF THE UNITED STATES NATIONAL CANCER INSTITUTE.



You recently published a critical review on translational research in oncology. What are your criticisms?

Progress in preventing or treating many types of cancer has been slow, and most metastatic solid tumors are still incurable. The public can be excused for asking when progress in basic research will be translated into greater patient benefit. Why is success always around the corner? Why do the breakthroughs in basic research so rarely translate to breakthroughs in treatment? Although there are many reasons for optimism in the future, in order to move forward effectively, it is important to look backward critically and identify key problems.

What is holding up progress?

There are roadblocks to progress. The main problem as I see it is that the pharmaceutical companies mostly develop drugs that are easy to develop. They don't develop drugs against mutations that are commonly found in tumors but that no one knows how to "target". Basic research has discovered those mutations, but no one is translating those findings into clinical benefit because no one knows how to do it. The basic research findings are not translatable without extensive new research of the type that is too high-risk for either academics applying for grants or for the pharmaceutical industry. And so it never happens.

Another roadblock, of course, is the complexity of trying to bring a new drug to the clinic. You have to overcome regulatory issues, human subject approvals, intellectual property issues, lack of funding, lack of patients, lack of training for physician-investigators, and a fragmented infrastructure for research.

So you are pessimistic about the future of translational oncology?

A basic research by individual investigators working alone and genetic sequencing work on tumors have led to great improvements in our knowledge of tumor development. I am optimistic that such progress in basic research will continue. But generally speaking, progress in translational research has been limited by an inadequate understanding of the process of tumor development. I believe that today overcoming roadblocks to translating basic research into clinical applications may require the creation of new organizations or the funding of teams focused specifically on key high-risk projects. And that may require a paradigm change.

"WHY DO THE BREAKTHROUGHS IN BASIC RESEARCH SO RARELY TRANSLATE TO BREAKTHROUGHS IN TREATMENT?"

INTERVIEW WITH

IN THE FIELD

From molecule to vaccine

THE PROBLEM

For a long time, it was thought that the immune system did not recognize cancer cells as an enemy, as it does with viruses and bacteria, and hence triggers no immune reaction letting it grow uncontrollably. Studies have demonstrated that this might not be completely true, and that cancers are associated with specific substances (known as antigens) that trigger the response of the immune system. Over the past 10 years, there has been remarkable progress made and an accumulation of scientific evidence for the concept of cancer immunology, and how to make this knowledge useful for the development of a lifesaving vaccine.

THE IDEA

After a decade of basic research, researchers at the Pasteur Institute in Paris have succeeded in stimulating immune system responses to antigens specifically associated with certain tumors, paving the way for the development of therapeutic cancer vaccines. One particular antigen – Tn – attracted their attention, being present in large numbers on the surface of adenocarcinomas such prostate, colon, breast and lung cancers. This discovery was further developed, and after years of translational work, the Institute's researchers were able to develop a new type of compound (code-named MAG-Tn3) which triggers the rejection of the tumors by the immune system. A strongly positive stimulation of the immune system by this compound was demonstrated in mice, provoking a very strong antibody response which prevented tumor growth in 70% to 90% of cases, and the disappearance of the tumor in 80% of cases. The team then worked on preparing a candidate vaccine for tests on patients. This meant conducting a feasibility study for industrial production of the vaccine using a chemical synthesis procedure, the production of a clinical batch, and a toxicology study. Having successfully completed all these stages, the candidate vaccine is now ready to be approved by the authorities and to be clinically tested on humans.

THE IMPACT

The Pasteur researchers are preparing their vaccine for submission to the French regulatory authorities with a view to testing it in human clinical trials, initially for its safety and for its ability to produce sufficiently strong immune responses. If the results of these trials are positive, the vaccine will be tested for anti-tumor efficacy in progressively larger-scale human trials on patients. There is great hope that the final results of this work will prove to be a significant breakthrough in the fight against adenocarcinomas, which account for the majority of cancer cases.

DONOR'S CORNER

Whilst providing a key link between the lab and the patients, translational research has, until recently, been an underfunded and poorly recognized area. Although funding for basic research is typically covered by government funding, and clinical research is undertaken by the pharmaceutical industry, translational research easily falls between the cracks. This is especially true in times of economic hardship, when public funding is drying up and the pharmaceutical industry is increasingly adverse to the risks that innovative, but untested, solutions imply. Private donors and foundations can provide key funding in this area.

IMPROVE TRAINING AND LEARNING OPPORTUNITIES

One barrier to the translation of basic discoveries into solutions that benefit patients is the relative lack of multidisciplinary educational opportunities and the full-time work contract required by both research and clinical institutions that binds researchers and clinicians to their respective desks. This is why you may wish to support training initiatives, fellowships and/or exchanges that help break this dichotomy and give experts a "protected translational time" that could provide the necessary stimulus to produce life-saving outcomes for patients.

FOSTER COLLABORATION

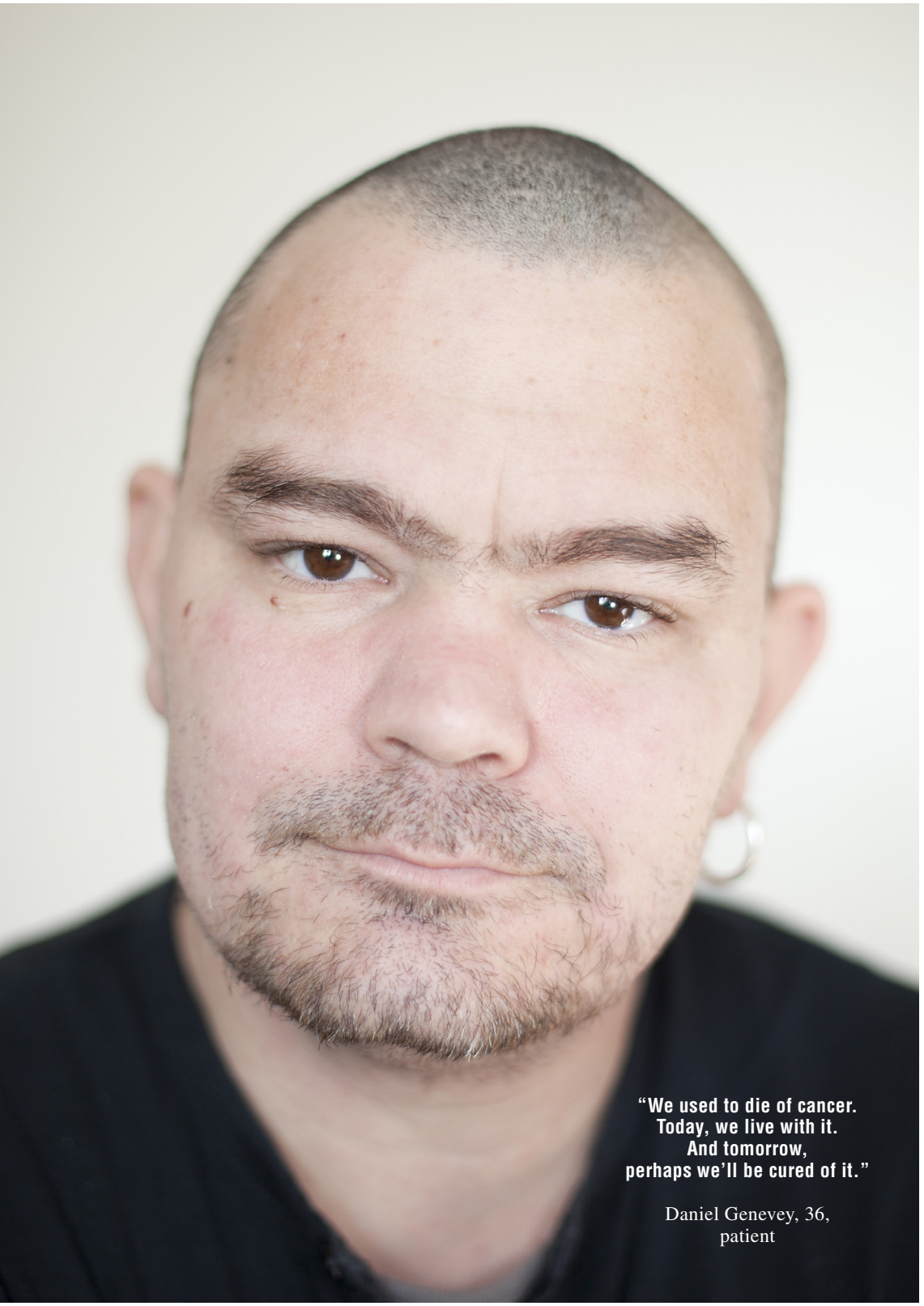
Cooperation underpins translational cancer research: physicians must be able to mingle freely and frequently with researchers and vice versa. Although many donors may not think about it, supporting researchers by paying for their travel expenses, participation to seminars, or the organization of workshops and conferences that allow for sustained collaborative efforts and knowledge exchange, helps generate new solutions. Another initiative you could consider to increase collaboration would be to support the creation of an association focused specifically on translational research.

ATTRACT TALENTED PEOPLE AND RAISE THE PROFILE

Translational research remains a relatively low-profile area for researchers, and the lack of funding keeps many talented researchers away from this field. You may want to address this by creating or supporting a competition or an award that would raise the profile of translational research projects in the cancer world and spur advances in this domain.

HIGH RISK OPPORTUNITIES

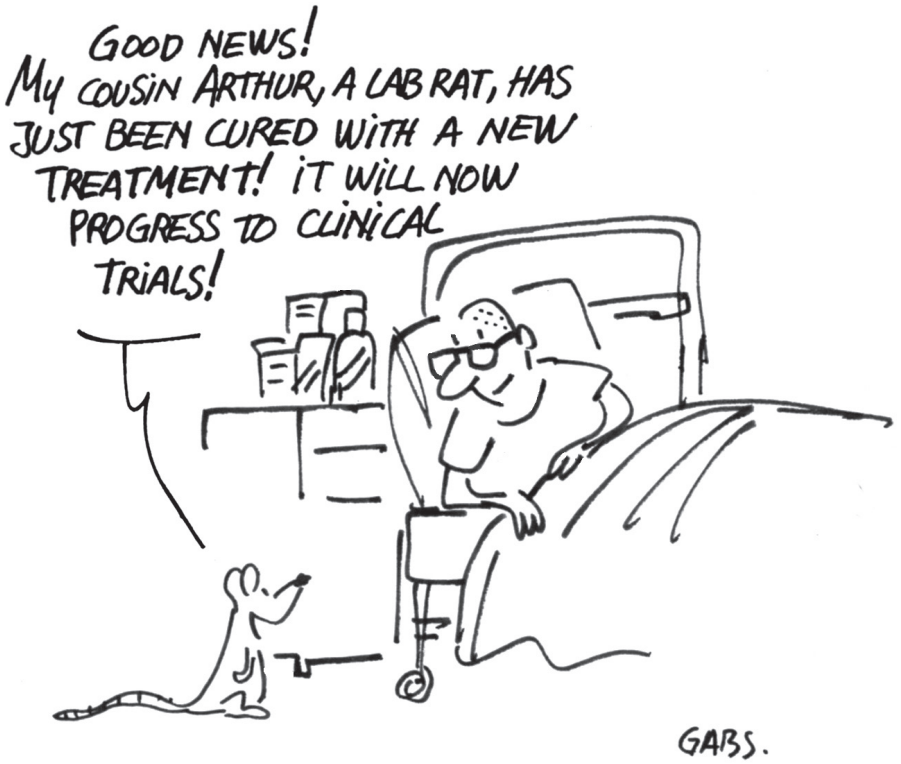
Neither funding agencies nor the pharmaceutical industry are prepared to run the risk of funding innovative research projects. Although relatively risky, some of these projects have enormous potential. So if you are a donor who is willing to take some risks, this is a perfect area for you. Research projects on targeted drug therapies, preventive cancer vaccines and more effective biomarkers are all promising areas that require additional funding from private donors.

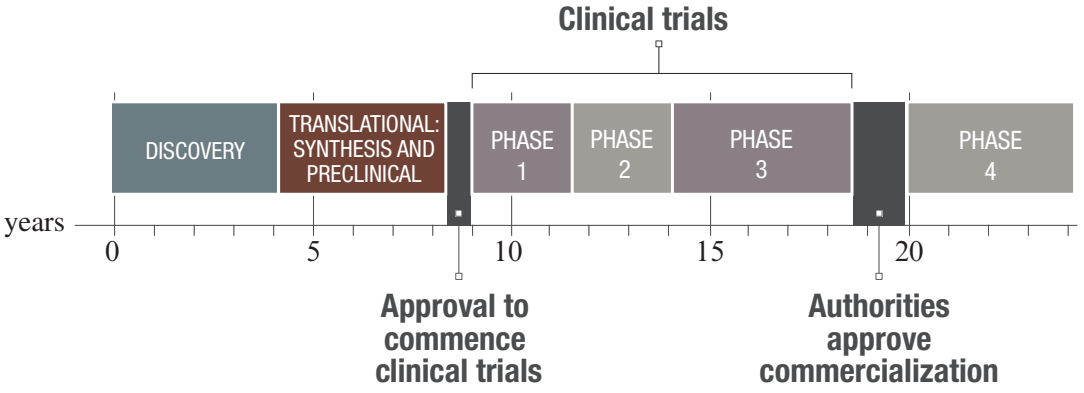

“We used to die of cancer.
Today, we live with it.
And tomorrow,
perhaps we’ll be cured of it.”
Daniel Genevey, 36,
patient

CLINICAL RESEARCH

MAKING IT WORK IN PEOPLE

5


GOOD NEWS!
MY COUSIN ARTHUR, A LAB RAT, HAS JUST BEEN CURED WITH A NEW TREATMENT! IT WILL NOW PROGRESS TO CLINICAL TRIALS!
GABS.


Clinical trials
DISCOVERY
TRANSLATIONAL: SYNTHESIS AND PRECLINICAL
PHASE 1
PHASE 2
PHASE 3
PHASE 4
years
0
5
10
15
20
Approval to commence clinical trials
Authorities approve commercialization

Clinical trials are one of the final stages of a long and painstaking cancer research process.

Where as basic research seeks answers to questions about the disease and its underlying mechanisms, clinical research seeks answers to questions relating to patients and how they respond to drugs and procedures aimed to prevent, detect or treat diseases.

In cancer research, a clinical trial is designed to show how a certain preventive approach, a new diagnostic test, a promising drug or a new surgical procedure can affect the people receiving it. Although patients know that participating in these trials does not necessarily guarantee them a better chance of survival, it does represent an important contribution to the overall fight against the disease. As Wally Yocum, who was diagnosed with chronic lymphocytic leukemia in his mid-fifties, explains: "I'm also doing this so that maybe someday others won't have to go through it. Maybe I can be part of a trial that leads to a cure, or at least to better treatment. The number of people you can help by doing something like this is infinite."

A LONG AND WINDING ROAD

It takes an average of 12 to 15 years from the time a discovery is made in basic research until it reaches your drugstore. This is partly due to rendering the discovery actionable (translational research- see Chapter 4), for example using that knowledge to produce a candidate drug, fine-tuning the right catalysts and adjuvants and testing its safety and effectiveness on animals. Once a candidate is available and has received approval from the competent national authorities, the long, and sometimes excruciatingly slow, journey through the many phases of clinical trials may commence (figure p. 52).

These trials are conducted according to a progressive step-by-step sequence, each with a distinct goal, as described below.

PHASE I: The first set of trials are conducted on approaches that appeared promising after extensive laboratory research, animal testing, and the filing of an application with the competent national drug authorities. The purpose of this phase is to focus on determining the safety and side-effects, as well as the proper dosage of the drug. Only a small number of people (usually a couple of dozen) are accepted to take part in these studies, and they usually volunteer because other treatments are no longer effective.

PHASE II: A slightly larger group of participants is involved to further investigate safety, dosages, and to get a preliminary idea as to whether the approach has a positive effect against the cancer.

PHASE III: These trials, which usually involve hundreds or even thousands of volunteers, compare the new approach with the best standard approach, and this is the final phase before the national drug authorities' approval. Some people enrolling in this type of trial are randomly chosen to receive the new treatment, whilst others will be offered the standard treatment (control group). The purpose of this type of trial is to determine whether the new treatment is more beneficial than the standard therapy or indeed if it adds any benefit at all.

If all these steps are successful, the approach can then be submitted to the country's regulatory authorities that make the final decision whether to allow the drug or procedure to be used on human subjects or not. The fourth and final step, once the drug or procedure is being used, involves surveillance of the population to detect any side-effects that could justify withdrawal of the drug.

VINCENT DIEBOLT, HEAD OF THE FRENCH NATIONAL CENTRE FOR THE MANAGEMENT OF CLINICAL TRIALS ON HEALTH PRODUCTS.

Clinical trials on innovative drugs are sometimes criticized for not giving priority to the needs of the patients participating in these trials.

First of all, a clinical trial must be carefully planned and based on a scientifically sound hypothesis. The possible risks to participating patients must also be carefully evaluated before starting a trial. And the researchers organizing the trial must ask themselves if the trial is likely to produce worthwhile information. Secondly, patients should be told that any new drug or procedure that is ready for a trial on human subjects will have already been tested in laboratory studies and on animals not only for its efficacy, but more importantly, for safety.

Some cancer patient associations complain that clinical trials often fail to keep patients properly informed about their role in the trial and the risks involved. What are your views on this?

This brings up the question of informed consent. Of course, the patient has to be informed. But how much information should be given? Should the consent form be so exhaustive as to be almost unintelligible? Or so concise as to be incomplete? It's a real dilemma. And, of course, very often a cancer patient is in a fragile psychological or physical state and may not be able to fully understand the informed consent process. Should the investigator seek advice from a family member of the patient? My view is that as far as possible one should allow the patient, however ill, to make his or her own decisions.

What about patients who receive a placebo and not the actual drug, and don't know which they are getting?

A placebo should never be given to a patient if this procedure is likely to worsen the patient's health. And the patient should always be informed from the outset that there is a 50% likelihood of being given a placebo and not the real drug, if that is how the trial is being set up.

The possibility of entering a clinical trial on a new drug is often proposed as a last resort to a patient in the terminal stages of cancer. Can such a patient really refuse to take this last chance?

I hate to say this, but such a patient often has neither the time nor the option of refusing. I believe that at this stage of the disease, the patient should be told not so much about the risks, but about the chance, however slight, of surviving thanks to the new drug. The patient should be informed, though, that taking that chance may mean going through more suffering and more pain.

"ONE SHOULD ALLOW THE PATIENT TO MAKE HIS OWN DECISIONS."

IN THE FIELD

A life-prolonging drug against lung cancer

THE PROBLEM

In up to 40% of patients with so-called "non-small-cell lung cancer" (NSCLC), which is the most common type of lung cancer, the cancer cells carry on their surface an abnormal molecule called EGFR. This molecule makes the tumor grow and spread more quickly. The results of a clinical trial on a new drug that inhibits the action of the EGFR molecule were presented to the American Society of Clinical Oncology (ASCO) at its meeting in June 2012. The new drug is called 'afatinib'.

THE IDEA

The clinical trial was conducted to determine the efficacy of afatinib in NSCLC patients with the abnormal EGFR molecule. A total of 345 patients participated in the trial. None had received any previous treatment. The patients were divided into two groups: one group was treated with standard intravenous chemotherapy, and the other with the afatinib tablet.

THE IMPACT

After eight months, the tumors of the chemotherapy group had progressed twice as fast as those of the patients on afatinib, suggesting that the drug could indeed prolong survival of these lung cancer patients by almost a year. The trial will continue for up to two years, by which time the total survival time gained thanks to afatinib will be known. The chief investigator of the trial, Professor James Hsin Yang of the National Taiwan University, told the ASCO meeting that the new drug not only appears to lengthen patients' lives, but also reduces their symptoms, thus improving their quality of life. What's more, since the drug is taken orally, patients do not need to attend hospital, as they do for weekly chemotherapy sessions. Boehringer Ingelheim, the manufacturer of the drug, has started recruiting patients for a new clinical trial comparing afatinib with the two other drugs on the market designed to inhibit the growth of EGFR-positive lung tumors.

DONOR'S CORNER

Clinical research is primarily funded by pharmaceutical companies, which are usually the ones best placed to assess the potential of a finding or a discovery, and as such provide funding to the clinical trials needed to put it on the market. Despite this, private donors may want to explore this area to help overcome existing bottlenecks or to fund trials that hold great potential or are disregarded by the pharmaceutical industry. Here are a few ideas of clinical research areas that a private donor may want to consider:

INFORMING AND PROMOTING TRIALS

For a variety of reasons, few patients have the opportunity to participate in trials, and this has a range of unfortunate consequences. Some trials have to be abandoned because of a lack of patients, and others, such as those for relatively rare kinds of cancer, can never be conducted at all. Moreover, the elderly, a burgeoning group amongst those who will require treatment, are seriously underrepresented in clinical trials, as are minorities and, in some areas, women. You may decide to support advertising campaigns, social media platforms, or online databases and search engines to inform both more patients and doctors about the trials that are going on, their benefits and their drawbacks, to help increase and inform participation.

TWEAKING THE FORMULA

Treatments that are safe and effective when used under certain conditions or in certain countries may not be so when used in other parts of the world. In fact, different doses or dose regimens may be required depending on a number of factors (climate, ethnicity, diet or other diseases). Plans are underway, for example, to test certain chemotherapeutic drugs in a number of developing countries on children with cancers, such as leukemia and Burkett's lymphoma, that generally respond well to chemotherapy in the richer countries of the world, but that need to be slightly changed to best suit local conditions. Funding, however, is lacking for these sorts of trial, which hold relatively little commercial interest for the pharmaceutical companies.

REINVENTING THE WHEEL

Once a treatment has been approved by the authorities and is on the market, phase four trials may be conducted to improve drug composition, its cost-effectiveness, or to see whether the same drug could be used for other cancers or uses. These trials, which can hold great promises and build on existing successes, are still relatively rare and seldom find funding within the pharmaceutical industry, so as a private donor, you may want to support the implementation of these trials.

“Basic research could lead to the discovery of particularly effective individualized therapy.”

Lucienne Bigler-Perrotin, 57, Director of the Geneva Cancer League

TREATMENT

CURING AND IMPROVING CHANCES OF SURVIVAL

6

COMPLEMENTARY AND ALTERNATIVE MEDICINE

Complementary and alternative medicine (CAM) is the term for medical products and practices that are not part of standard medical care. Claims made by CAM treatment providers about their benefits appear promising, and studies are underway to determine the safety and usefulness of many cancer-related CAM practices.

Overview of CAM Approaches:

- Alternative Medical Systems, such as acupuncture, Ayurveda, homeopathy and traditional Chinese medicine have evolved over time in different cultures and parts of the world for use in cancer and other conditions.
- Mind-Body Methods, including meditation, hypnosis, and certain types of yoga practices, are based on the belief that the mind can affect the body's response to cancer. These methods may help to reduce the side-effects caused by the treatment, and improve physical, emotional and spiritual well-being.
- Nutritional Methods claim that special diets or supplements can be used in the treatment of people with cancer. Examples that may benefit cancer patients are macrobiotic diets and antioxidants.
- Pharmacologic and Biologic Treatments involve the use of prescription drugs in a way not originally intended; vaccines, hormones, natural products (also called botanicals), and other biologic treatments used in the treatment of people with cancer. Herbal extracts and other herbs are also included.

SPOTLIGHT

The classic treatment of a cancer patient uses a combination of chemotherapy, surgery and radiation therapy. This medical weaponry is required to penetrate the formidable defenses of most cancers.

THE THREE PILLARS OF CANCER TREATMENT

SURGERY: Surgery remains the mainstay of cancer treatment, and alone it cures about half of solid tumors (such as breast and colorectal), which represent 95% of cancers. Despite advances in other treatment approaches, cancer experts believe that surgery will continue to play a fundamental role in cancer treatment. New technologies, such as robotic surgery or the use of tiny (laparoscopic) incisions to insert cameras and surgical instruments to perform image-guided operations, will no doubt make surgery even more effective, less invasive, and more precise.

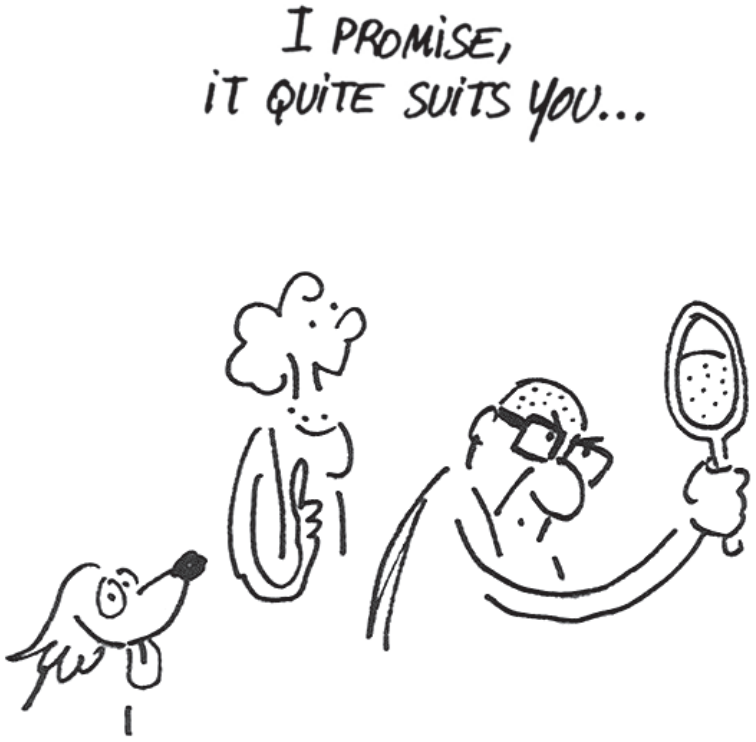
RADIATION THERAPY: For over a century, since the discovery of X-rays in 1895, ionizing radiation has been used to treat cancer patients. Radiation therapy uses high-energy radiation to shrink tumors and kill cancer cells by damaging their DNA. X-rays, gamma rays and charged particles are types of radiation used for cancer treatment. The radiation may be delivered by a machine outside the body, or it may come from radioactive material placed inside the body near the cancer cells (internal radiation therapy, also called brachytherapy).

Radiotherapy is one of the least expensive cancer treatments, and one of the most effective in terms of cure and overall survival. It works best and can be curative on tumors that are small and localized. For larger tumors, radiation therapy is generally used after the tumor has been removed surgically, shrunk by chemotherapy, or rendered more vulnerable to radiation by certain radio-sensitizing drugs. On the other hand, for metastatic tumors that have spread to different parts of the body, radiation cannot be used. Radiation typically also damages healthy tissues surrounding the tumor, leading to side-effects (see Donor's corner p. 66).

CHEMOTHERAPY: First used in the 1950s, chemotherapy uses drugs to destroy cancer cells by stopping or slowing their growth. Today, cancer clinicians have a choice of more than 100 different drugs they can pit against cancer. Generally, a combination of drugs acting in different ways is used simultaneously to overcome the resistance of cancer cells to individual drugs. Chemotherapy works best on "young" tumors that have not yet built a tissue shield that prevents drugs from penetrating the tumor. Nonetheless, chemotherapy remains a costly procedure and the least effective in terms of cure and overall survival.

> **"The big world of drugs provides us with remarkably few cures. When we look overall at solid tumors, the cure rate with drugs is extremely low and in most cancer types it's a big question to ask if we can cure anybody with these drugs."**
>
> Alexander Eggermont,
> Director, Institut Gustave Roussy

Moreover, the greatest inconvenience of chemotherapy is that the drugs target all fast-growing cells, regardless of whether they are cancerous or healthy. It therefore harms healthy cells that divide quickly, such as those that line your mouth and intestines or cause your hair to grow, causing physical and psychological pain. New types and combinations of chemotherapy drugs, including drugs that target the cancer cells more selectively, have slightly reduced the severity of side-effects and have increased the proportion of cures for some types of cancer, notably childhood leukemia and lymphoma, and, in adults, Hodgkin's disease and testicular cancers.


I PROMISE,
IT QUITE SUITS YOU...

BEYOND STANDARD TREATMENT

An area of clinical research that has become particularly dynamic in recent years is the assessment of treatment approaches that go beyond the traditional surgery-chemotherapy-radiation triad. Here are a few examples of approaches that are theoretically promising, but are still under study:

TARGETED OR MOLECULAR THERAPIES (see Chapter 4) are delivered by drugs or other substances that block the growth and spread of cancer by interfering with specific molecules involved in tumor growth and progression.

GENE THERAPY introduces genes into a patient's body that arrest the growth of tumors or produce substances, such as certain enzymes, that can make cancers more vulnerable to chemotherapy.

TELOMERASE THERAPY is based on the fact that most cancer cells are immortal, thanks in large measure to a chemical substance called "telomerase". Several drugs are being tested in human (clinical) trials for their ability to counter the effect of telomerase and make malignant cells die after a limited number of cell divisions.

PHOTODYNAMIC THERAPY uses light in combination with a drug that becomes active when exposed to light of a certain wavelength. Several photosensitive drugs are being tested for use in this therapy.

RADIOFREQUENCY WAVE TREATMENT uses radio waves to heat tiny particles of metals, such as gold or carbon, that have been implanted in the cancerous tissue. Tests on animals have proved promising, and clinical trials on human subjects may soon begin.

TUMOR TREATING FIELDS is a therapy that uses external electrodes to create an electric field in a part of the body where a tumor is located. The electric field disturbs the rapid division that cancer cells usually undergo. This therapy is in early clinical trials for the treatment of certain cancers. Some trials have produced promising results.

HYPERTHERMIA (or thermal) therapy exposes body tissues to high temperatures in order to kill cancer cells. It is nearly always used with radiation therapy or chemotherapy. Many clinical trials are underway based on this approach and some have shown a significant reduction in tumor size when hyperthermia is combined with other treatments (see 'In the field').

HIGH-INTENSITY FOCUSED ULTRASOUND THERAPY is a form of hyperthermia therapy that introduces ultrasound energy into the body. Since 2001, it has been used extensively in China and other South-East Asian countries. It was first used to treat prostate cancer, and has since been successfully used to destroy many types of solid tumors. In the West, the approach is still being investigated for its effectiveness.

DON S. DIZON, DIRECTOR OF MEDICAL ONCOLOGY, WOMEN AND INFANTS HOSPITAL, PROVIDENCE, RHODE ISLAND, USA.

You recently posted a description of a case of "autonomy" in a patient with cancer of the ovary on the American Society of Clinical Oncology website. Why autonomy, and what was so special about this case?

I had just had a discussion with a colleague about how to improve the quality of life of a cancer patient while making sure the cancer was being treated. We got onto the subject of what is meant by the term "acceptable treatment toxicity" and who decides what is acceptable. And that reminded me of this patient. She was in her 50s and had a cancer of the ovary. She had had three courses of chemotherapy. From her treatment history, I saw that she had never been given PLD (pegylated liposomal doxorubicin), one of the most effective drugs against ovarian cancer. So I suggested to her that she should be put on this drug. But she refused point blank.

What was your reaction?

I just couldn't believe it. I asked her how she could refuse a drug that would effectively fight her cancer. She said she knew about PLD and the skin reactions it could cause. She said she was afraid that these skin reactions would prevent her from wearing high-heeled shoes. She said to me: "Dr. Dizon, my cancer has deprived me of so many passions. I have very few left. One is my love of shoes, particularly high-heeled shoes. Believe me, my life will not be worth living if I cannot wear those shoes. No drug is worth giving them up."

Did you insist?

I was so surprised. I thought how foolish she was being. After all, I was offering a drug that could help stop the cancer in its tracks and prolong her life. And yet, instead of taking my advice, she rejected it; wouldn't even consider it. And then it came to me that it was not for me to determine what toxicity is "acceptable." I am not the one who must live with treatment and its impact on daily life. She has to look at herself every day, fight cancer, and fight to remain true to who she is despite the cancer.

And the lesson you draw from this encounter?

Perhaps one of the hardest lessons for an oncologist is to acknowledge that despite the best evidence, we cannot dictate treatments. Cancer takes away so much from the person living with it. It forces our patients to change, to accommodate to it and its therapies. Because of this, I have a deep respect for the ability of our patients to choose. In our mission to provide comfort and hope, we must accept without judgment the autonomy of patients and the informed choices our patients make.

"CANCER TAKES AWAY SO MUCH FROM THE PERSON LIVING WITH IT"

IN THE FIELD

The killing heat

THE PROBLEM

Breast cancer commonly calls for the surgical removal of the tumor. Depending on the stage of advancement and spread of the tumor, the operation can be mutilating. A Swedish team has pioneered a "minimally invasive" method that uses heat to kill cancer cells in small, early breast cancers.

THE IDEA

The method, called Preferential Radiofrequency Ablation (PRFA), aims to provide a more "patient-friendly" technique for the management of breast cancer. The technique, which can be performed in about an hour as an out-patient procedure, consists of placing a thin electrode into the tumor. Ultrasound imaging allows the operator to position the electrode exactly in the center of the tumor. The electrode is then heated to 85º C for 10 minutes. This procedure kills the cancer cells without harming the surrounding tissues.

THE IMPACT

The PRFA technique has a high success rate. In a study of the technique on 31 patients with breast cancer who had been scheduled for partial removal of the breast, PRFA completely destroyed the tumor in 28 of the patients, as verified by analysis of biopsy tissue. Complications are rare. Unlike invasive surgery, PRFA leaves no scars and requires no patient recovery time. Researchers at Sweden's Karolinska University are studying the use of PRFA in elderly women who, because of their age, are not candidates for surgery. To date, the technique has been successful in all elderly patients on whom the technique has been applied.

DONOR'S CORNER

Treatment forms the crux of the struggle against cancer, and is one of the areas where progress is most urgently needed. In each treatment domain, there are still improvements to be made that could have a clear impact on the quality and outcome of care. Although national health systems and pharmaceutical companies remain major players in this domain, there is a significant margin of action for private donors interested in helping the improvement and development of treatment.

REINFORCING SURGERY

Surgery remains the most effective curative approach we have against cancer. The quality of the equipment, the standardization of surgery and the training of surgeons are the cheapest and most effective ways of improving the outcome in the treatment of solid tumors. Given the lack of resources of the public health system, private funding can make a real difference in this field. For example, you could help a hospital buy a cutting-edge surgery robot that can perform very precise operations, for example in brain or pediatric surgery.

TRAINING RADIOTHERAPY PROFESSIONALS

The most important component of any radiotherapy treatment is highly trained personnel in a variety of interrelated disciplines ranging from radiation oncologists to radiotherapy technicians, medical physicists and maintenance engineers. Investment in equipment without concomitant investment in training is counterproductive and dangerous. Funding in this area is low (especially in poorer communities) and you may wish to consider supporting special training initiatives to help technicians deign approaches that are comprehensive, replicable, of high quality and safe.

MORE DRUG RESEARCH

In the big world of drugs, only very few provide a real cure for cancer. Testicular cancer, leukemia and lymphomas are amongst the only cancers that we can now cure in very large numbers, but for most solid cancers (such as lung and pancreas), curative drugs are still not available. In other cancers, however, such as melanoma, there is some very interesting progress underway, and this is now being applied to other cancers. As a donor, you should try to look for research areas that are not sufficiently supported by the pharmaceutical industry; for example, research focused on very rare, but possibly curable, cancers (like early childhood or heart cancers).


“Universities and research institutes
are increasingly contributing
to the development of new therapies.
Thanks to them and to donations,
most cancers will probably
be treatable by 2030 or 2040.”
Thanos Halazonetis,
52, cancer researcher

SURVIVORSHIP

PROVIDING HOLISTIC CARE AND SUPPORT

7


BOOM!
POW!
CRACK!
EVERYTHING'S FINE. HE'S USING POSITIVE THINKING TO FIGHT AGAINST THE DISEASE.
GABS.

For individuals with cancer, theirs is a daily struggle, which requires holistic support. The same is true for their loved ones, who fight by their side against the disease. Moreover, even once cancer is won, returning to "normal" life may be a challenge, making survivorship a mixed blessing.

There are a number of self-reinforcing actions and support mechanisms that can help improve the quality of life of patients, and these should be provided during and after each individual's fight against cancer.

Cancer chemotherapy and radiation therapy will, almost without exception, damage some normal tissue and the immune system. For a long time, it has been known that radiation both enhances and halts cancer growth. Damaging the immune system in turn is known to promote the growth of some other kinds of cancer. We do not yet have really outstanding treatments for most cancers. Modern medicine in general, and cancer treatment in particular, is very imperfect. In the hope of curing or helping patients, the medical profession uses rather drastic treatments for devastating diseases they know will kill someone in a short time. Many oncologists do not provide families with enough information for them to understand how drastic these treatments are and how serious their adverse effects can be.

As explained by Gregory, who lost his wife and is now devoting his life to supporting the fight against cancer: "The quality of life must be considered as a major decision point in cancer care. That element, which has been lacking for so long in most clinics, hopefully will be brought to the forefront. It takes time for doctors to sit down with patients and truly explain the benefits and the risks of treatment. In an ideal world, patients would consider the benefits and the risks of each treatment and make an informed decision with the guidance of a wise doctor. But, busy doctors seldom spend much time discussing the benefits and the risks, and few patients ever question whether treatment may do more harm than good."

PALLIATIVE TREATMENT AND CARE

Palliative medicine is primarily aimed at attenuating the symptoms of a disease. Contrary to popular belief, its use is not confined to patients in the terminal stages of their disease, but is and should be used at any stage of the disease to ease the pain and the collateral effects of treatment. Moreover, in recent years, its scope has expanded to include relief not only from physical pain, but also from suffering and distress in all areas of a patient's life—mental, emotional, social, etc.

Palliative treatment is also used in combination with curative treatment. Several palliative approaches and technologies, for example, have been developed to make chemotherapy safer and more tolerable: so-called "anti-emetic" drugs can reduce the nausea and vomiting associated with chemotherapy. Other drugs stimulate the production in bone marrow of red and white blood cells to replace the blood cells destroyed by chemotherapy, thus helping to prevent severe infections that were common during cancer treatment. However, other recently-developed drugs can reduce the risk of bone fractures caused by metastases of certain cancers of the bone.

Relief of pain, however, which is the cause of serious suffering in about 80% of cancer patients, is the principal function of palliative treatment and pain-killing (analgesic) drugs. These drugs come in three main categories, ranked by strength of action, from the weakest, such as aspirin and paracetamol, to the slightly stronger, such as codeine (mild opioid), and the strongest, such as morphine (strong opioid).

LIFE AFTER CANCER

After an earthquake, there are victims and survivors, and there is no doubt about who is who. The victims are dead and the survivors are alive.

When it comes to cancer though, things are not so clear-cut. A person diagnosed with cancer and who has been successfully treated is always aware that however successful the treatment was, he or she can never be sure that the cancer will not return or that a new cancer may not arise. The sword of Damocles has lifted somewhat, but is still there, and for an ex-cancer patient, this can be a source of permanent anxiety.

Today, over two-thirds of adults diagnosed with cancer in the developed world are expected to live at least five years after the cancer is discovered (these figures rise to 90% for cancers of the cervix, breast, prostate and colorectum). Progress in detecting and treating cancers is producing a growing population of survivors and has already given rise to a new discipline: survivorship.

This discipline deals with the problems faced by survivors—and also their families, friends and caregivers—and the efforts needed to cope with a series of challenges. In fact, survivors and their loved ones often face physical, emotional, social and financial difficulties. They may also face problems of reintegration into society and of access to the entitlements, such as insurance and healthcare, that society provides. This is particularly true of already disadvantaged communities, such as poorer communities or developing countries.

"If you can do nothing else for a cancer patient, at least ensure that he or she doesn't die in pain. Someone in pain can't interact with anyone else and is completely shut off from family and friends. The solution – morphine – is very cheap and has been around for 200 years. And it could be readily available. In some countries, however, there are regulatory barriers that prevent patients from being administered morphine. And there are also cultural barriers that must be pulled down."

Julie Torode,
Deputy CEO, Union for International Cancer Control

IN THE FIELD

Providing access to painkillers in Nigeria

THE PROBLEM

Every year, more than 3.3 million people die in pain without access to adequate pain relief treatment. Morphine is safe, inexpensive and easy to administer in resource-constrained settings. However, four out of five patients worldwide, most of whom are in developing countries, cannot access pain relief because of a number of factors, including legal restrictions, weak health systems, poorly-functioning markets, and misconceptions about drug misuse and addiction. This is especially true in Africa, where the administration of morphine is very strictly regulated and rarely used: in Nigeria, for example, only a couple hundred patients receive palliative care and some 170,000 die every year without pain relief.

THE IDEA

Treat the Pain is a joint program of the Union for International Cancer Control (UICC) and the American Cancer Society (ACS) to make effective pain control measures universally available to cancer patients by 2020. This objective can only be achieved by working alongside governments and civil society to overcome the obstacles that still prevent access to pain relief. This means raising awareness of this issue, changing legislation, ensuring appropriate supply and distribution, and training healthcare professionals to administer these drugs appropriately. The Treat the Pain program is now being developed in several African countries, including Uganda and Nigeria.

THE IMPACT

The approach was initially tested in Uganda, where it met with very encouraging results, and succeeded in lowering the price of morphine by 50% and making it accessible for free to all patients. In Nigeria, the second targeted country, the program aims to increase the number of patients receiving pain relief from the current count of 270 in 2010 to 100,000 by 2014. An agreement has already been signed with the Nigerian Ministry of Health to hire one full-time staff member to implement the project. The first real step in this direction was the government's purchase of 26 kilos of morphine – the morphine acquired since 2007 amounted to barely one kilo.

"This initiative will provide technical support to assist with the procurement of morphine, its distribution, and the scale-up of pain treatment services. We are hopeful that this important step forward by Nigeria, which is home to one in five Africans, signals the coming of a new era in government responses to the crisis of untreated pain"

Meg O'Brian
Director of Treat the Pain

DONOR'S CORNER

Helping cancer patients and survivors, as well as their families, to cope with their difficulties and improve their quality of life is a crucial aspect of the fight against cancer, although it is often underfunded by the public sector and ignored by the industry. It is therefore a perfect area for private donors to explore, and bring ideas and resources to. Here are some of the many actions you could support to make a real difference to the lives of many.

MEDICAL SUPPORT AND COUNSELING

Cancer survivors are at greater risk of cancer recurrence and of developing secondary cancers due to the effects of treatment, unhealthy behaviors, and other risk factors that contributed to the initial cancer. There are a lot of opportunities for you to support this problem area; for example, you could support projects, such as counseling services or mobile phone applications to help survivors keep to a schedule of follow-up visits and screening tests, inform them as to possible delayed effects of treatment, and help them identify early signs and symptoms.

PSYCHOLOGICAL CARE

Helping patients and survivors to cope with their difficulties calls for counseling and strategies to improve the quality of their lives and psychological state. Each person, however, reacts differently to cancer: while some are overwhelmed and fall into a depressive or destructive pattern, others describe the process of fighting cancer as a life-changing experience and an opportunity to become "a better person" or to engage in constructive, positive and challenging endeavors. If this is an area that appeals to you, there is a big need for funding projects at a community and grassroots levels, which are key to helping patients deal with their disease as best they can. For example, you could support workshops or retreats, or an expedition to climb a mountain, a yoga workshop, etc.

FINANCIAL SUPPORT

Many patients coming from rural or disadvantaged backgrounds face a number of problems when they learn they have cancer. Even when treatment is covered by their insurance, they need to face a number of financial and logistical difficulties. By supporting or setting up solidarity funds, for example, you can support patients by providing gas vouchers or train tickets so that they can get to treatment, help them pay for palliative medicines, supply free or low-cost wigs, or offer babysitting support for single mothers.

SUPPORT TO FAMILIES AND LOVED ONES

One of the often overlooked victims of cancer is the patient's family, which struggles against the disease alongside their loved one, and all too often have to deal with pain and loss. There is a lack of funding in this area, and you may consider supporting programs targeted at the families of patients, such as self-help groups to help them cope with the news or seminars to learn more about the disease and treatment opportunities, or counseling sessions to prepare them for the worst. Many of these initiatives already exist, but they must be scaled up and replicated around the world.

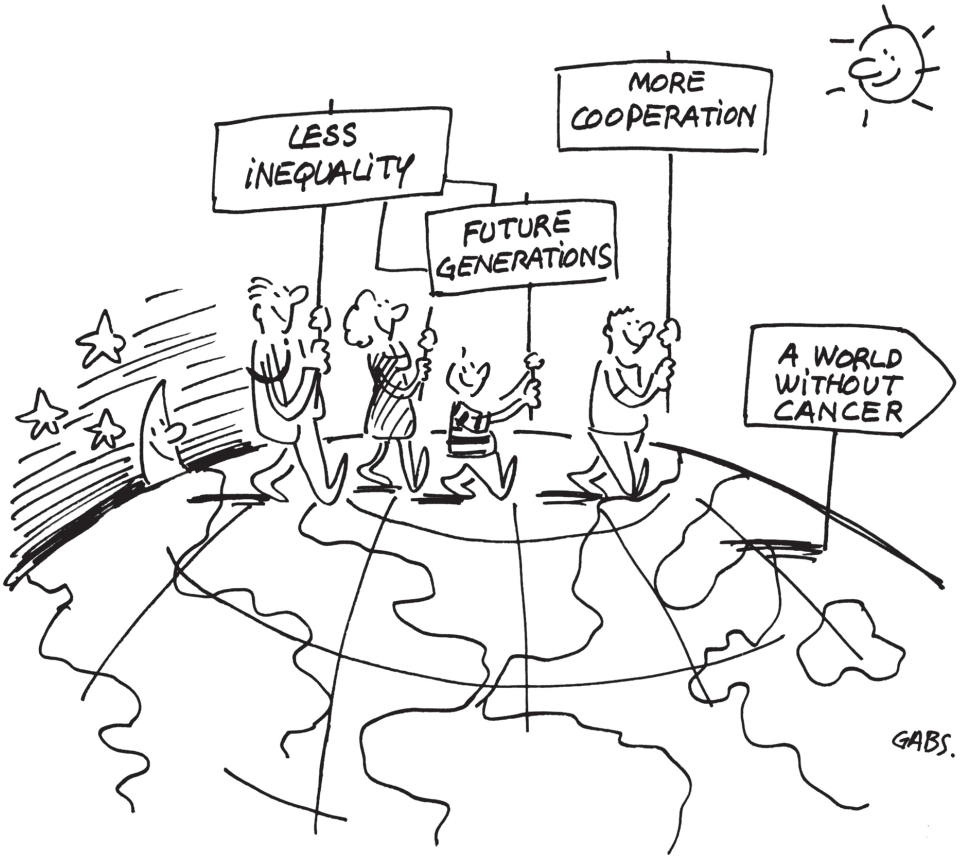
“To reduce the risk of developing cancer, we must understand what triggers the disease. Only research will help us do that.”

Conny Vrieling, 44, radiation oncologist

TRANSVERSAL ACTIONS

ACTING ACROSS THE BOARD

8



MYTHS AND MISCONCEPTIONS

Cancer is perhaps the most widely discussed disease today. We hear about it on television, read about it in the newspaper, participate in walks to raise money, and give donations from our hearts. It has touched the lives of almost everyone, whether directly or through a loved one, colleague or friend. So, it is surprising to find that in our information-saturated society, there are still many myths and misconceptions that abound.

Surveys conducted both in the United States and in England show that many people have a very limited knowledge of what cancer is, how it can be prevented, and how it can be fought. Amongst some popular misconceptions that still exist today is the belief that cancer is contagious, incurable and unpreventable. There is also still a lot of misinformation as to what causes cancer, what the real incidence of certain factors is, and what treatments are actually proven to be effective.

SPOTLIGHT

Unlike the previous chapters, which dealt with specific activities being carried out in the struggle against cancer, this chapter deals with issues that are cross-cutting.

THE NEXT GENERATION OF ONCOLOGISTS

One critical need resulting from the massive upsurge in cancer cases predicted over the coming years is the need for trained health professionals in all aspects of cancer research and clinical care. For a disease that covers such a wide range of human suffering—physical, mental, social, professional, and so on—the training of healthcare professionals will have to cover a correspondingly-wide range of disciplines. A further problem for developing countries is the substantial number of trained professionals who migrate to richer countries that offer better financial and career incentives.

SOME ARE MORE EQUAL THAN OTHERS

As the age-old dictum says, "we are all equal in the face of death". But when it comes to cancer, as with many other diseases, it is the poorest who bear the greatest burden. More than two-thirds of cancer deaths worldwide occur in developing countries, which are increasingly experiencing the risk factors already afflicting developed countries (an aging population, rapid urbanization and adoption of unhealthy lifestyles). However, developing countries are still lagging behind in terms of health services (screening, diagnosis, treatment, palliative care and support). If these countries had access to the existing technologies that benefit patients in developed countries, the burden of cancer would be hugely reduced. It's important to note that inequalities are not only across national borders and developed/developing divides: at national level, it is clear that a disproportionate rate of victims come from disadvantaged backgrounds and minority groups.

KNOWING IS PREVENTING

Perhaps the greatest barrier to winning the fight against cancer is that even today, this disease is still a taboo subject for many, often creating an aura of fear and resignation. In many parts of the world, particularly in the less developed countries, cancer is an unmentionable subject. Fighting a "hidden assassin" is an almost impossible task, and more needs to be done to bring this disease out in the light of day. Efforts to raise awareness and learn more about cancer play a central role in the fight against this disease. The effectiveness of these efforts stems from the scientific knowledge that has accumulated over the past half-century about what raises the risks of cancer, and how this disease can be fought.

> **"The first big step towards cancer prevention and control worldwide is to understand the magnitude and nature of the cancer burden"**
>
> IARC 2008

In developed countries, much is being done on this front, and thanks to mass campaigns and the relatively recent cultural acceptance of cancer as a disease that one can talk openly about, knowledge about cancer has, to a large extent, taken root, although much more must still be done (See Spotlight: Myths and Misconceptions). In developing countries, several barriers hamper efforts to raise awareness of cancer. Firstly, concern over cancer tends to be diluted in impoverished populations already burdened by an impressive roster of illnesses and other health-threatening factors. Secondly, cancer is still a taboo subject in many places. And another barrier is the lack of adequate resources in terms of trained personnel and technologies to implement the logical follow-up to awareness campaigns, namely, mass screening and effective therapy.

COMING TOGETHER

Today, there are so many players on the cancer stage, doing so many different things, in so many different ways, that one can only be amazed that, in the absence of an overall coordinating entity, real progress is being made in the various areas of cancer activity. In the UK alone, there are an estimated 600 charities involved in cancer work. Anyone wishing to find out who is doing what and where faces a number of practical difficulties. Furthermore, this multiplication of actors makes communication and collaboration difficult, and often results in an inefficient duplication of efforts.

THE BIG FISH

The **Program of Action for Cancer Therapy** (PACT) was set up by the International Atomic Energy Agency (IAEA) in 2004 to build on the Agency's experience in radiation medicine and technology, and enable developing countries to introduce, expand and/or improve their cancer care capacity by integrating radiotherapy into a comprehensive cancer control program.

The **International Agency for Research on Cancer** (IARC) is an inter-governmental agency based in Lyon, and is an extension of the UN World Health Organization. Its role is to conduct and coordinate research into the causes of cancer. It also conducts epidemiological studies into the occurrence of cancer worldwide. It maintains a series of monographs on the carcinogenic risks to humans posed by a variety of agents, mixtures and exposures.

The **Union for International Cancer Control** (UICC) is a membership non-governmental organization based in Geneva, and is dedicated to the global control of cancer. The UICC unites more than 400 member organizations in over 120 countries in the global fight against cancer, and strives to coordinate global initiatives and change policies at the international and national level.

The **National Cancer Institute** (NCI) is part of the National Institutes of Health (NIH), which is one of 11 operative agencies of the US Department of Health and Human Services. The NCI coordinates the US National Cancer Program and conducts and supports research, training, health information dissemination, and other activities related to the causes, prevention, diagnosis and treatment of cancer; the supportive care of cancer patients and their families; and cancer survivorship.

Cancer Research UK is a cancer research and awareness charity in the United Kingdom. As the world's largest independent cancer research charity, it conducts research into the prevention, diagnosis and treatment of the disease. Research activities are carried out in institutes, universities and hospitals across the UK, both by the charity's own employees and by its grant-funded researchers. It also provides information about cancer, and runs campaigns aimed at raising awareness of the disease and influencing public policy.

The **German Cancer Research Center** (known as the Deutsches Krebsforschungszentrum or DKFZ in German), is a national cancer research center based in Heidelberg. It is a member of the Helmholtz Association of German Research Centers, the largest scientific organization in Germany, and carries out research into understanding the mechanisms of cancer development and investigates cancer risk factors.

The **Institut national du cancer** (INCa) is a French public interest group set up to coordinate scientific research and the fight against cancer. It brings together key players in the fight against cancer (state hospital associations, health insurers, cancer centers and the national cancer league), and funds cancer research projects at national level. One of the missions of INCa is the development of organized screening, to ensure that patients have equal access to care, to promote prevention, to act in the field of professional training, and to improve care and communication to patients and their families (in conjunction with the High Authority of Health and the Ministry of Health).

IN THE FIELD

Training visually impaired women to detect breast cancer

THE PROBLEM

According to the World Health Organization, breast cancer is the most common cause of death among women in both developed and developing countries, claiming the lives of 600,000 globally. In Germany, breast cancer is the most common cause of death for women aged between 40 and 44, and every year, some 60,000 new cases are diagnosed. Early detection and treatment significantly increase the chances of survival. However, the standard method used – mammogram screening – is only offered to women aged 50 to 69, even though around 20% of breast cancer is detected in women under the age of 50. For these women, the only available screening method is palpation performed by their gynecologist as part of their routine check-up (usually once a year), but for which there is no standardized or evaluated method.

THE IDEA

Discovering Hands is an innovative program launched in Germany in 2006 that trains visually impaired women to detect early signs of breast cancer. After a two-year testing phase, the program is now in the process of being scaled up and expanded, both domestically and overseas. Its unique approach involves educating visually impaired women to enhance their already superior sensory skills to more accurately identify areas of inception and detect smaller lumps.

During a 9-month training program in disability centers, these women learn how to use standardized diagnostic methods for examining female breasts, as well as psychology, communications and administrative skills. They are either directly employed by resident doctors or hospitals, or work for different practices and/or hospitals on a freelance basis. The examination is either paid for by health insurance (to date, Discovering Hands has agreements with four companies in Germany) or by the patients themselves.

THE IMPACT

Today, around 20 blind women are part of the Discovering Hands network, working in 17 gynecology practices and hospitals throughout Germany. More than 8,000 examinations have been carried out to date. Preliminary qualitative results show that Discovering Hands examiners have an approximately 50% better rate of overall detection than doctors, and an improvement of approximately 30% when it comes to smaller tissue alterations in the breast. These results have generated interest from health services throughout Europe. Over and above the health benefits involved, Discovering Hands also has a further function in influencing perceptions of disability. By using the extraordinary sensory capabilities of visually impaired women, a perceived “disability” is transformed into a capability, thus creating a new field of meaningful employment.

DONOR'S CORNER

Cross-cutting issues, like the ones presented in this chapter, are also often the ones that receive the least support from governments, and usually none at all from the private sector. But they also require innovative, bold and out-of-the-box thinking, which is why they make the perfect ground for philanthropic engagement.

TRAINING THE NEXT GENERATION

Forecasts suggest that the need for training cancer experts (researchers, medical staff, technicians and social workers) will be great. What's more donors will have to boost their support in this area over the coming years. You could decide to help in this area by funding dedicated courses, chairs, fellowships, distance learning, etc. This may mean supporting courses for radiotherapy technicians in Cambodia, a Chair in translational research in France, or a north-south exchange of surgeons between Latin American hospitals and North American ones.

IMPROVING ACCESS

Guaranteeing universal access to good screening, detection, treatment and support is a pivotal challenge, not only in the fight against cancer, but the fight against many other diseases. In fact, technologies and drugs that are safe, effective and easily accessible in certain socio-economic contexts may not be so in poorer settings or peripheral locations. As a donor, you might wish to consider helping to bring new drugs or radiotherapy machinery to the rural regions of your own country, or create medical surgery facilities in developing settings. In other cases, such as palliative care (see page 71), for example, providing access may also mean supporting advocacy to bringing down the social, moral and legal barriers that prevent millions from having access to pain-relief treatments.

CANCER REGISTRIES

Much of our lack of information on the real impact of cancer is due to a shocking deficiency of cancer registries: less than 20% of the world's population is covered by cancer registration (less than 9% in Africa as a whole). Without cancer registries, governments remain ignorant of the magnitude of the cancer burden, do not acknowledge the priority that this issue represents, and cannot justify mounting anti-cancer efforts. Registries also help researchers to understand patterns in cancer development, for example, incidence differences along ethnic lines, nutritional habits or environmental factors. These data can also be used to guide future prevention efforts, monitor changes in disease patterns, and tailor early detection and primary prevention strategies.

INCREASING COLLABORATION

Supporting conferences, partnerships and summits that help decrease the fragmentation of the cancer sector and increase collaboration are a key area of intervention for private donors today. Some of the main cancer stakeholders are coming together in membership umbrella associations, or are forming alliances. But a great deal more can still be done in this area to ensure that the whole is greater than the sum of its parts.

A NEW BEGINNING

You have come to the end of your guided tour of the fight against cancer. Perhaps now you feel more comfortable beginning your own voyage as an active explorer.

We hope that your journey through these pages has shed light on possible areas of need and of promise where you might wish to add your support.

There is little doubt that we have come to a pivotal moment in the struggle against cancer. Already, recent research breakthroughs are producing new diagnostic and therapeutic approaches and new drugs that are beginning to reduce the number of cancer cases and deaths. There is still a long way to go, but your participation in the fight against cancer could shorten the time to victory.

After turning the last page of this guide, you may have more questions, more doubts, more ideas that you would like to discuss. We are here to listen to you and help you decide if, where and how you might want to engage in what could be a turning point in the struggle to defeat cancer.

May we wish you success and fulfillment in your new journey.

The Lombard Odier
Philanthropy Advisory Team

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Livestrong
www.livestrong.org

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IMPRESSUM

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